

STEEL

The Magazine of Metalworking and Metalproducing

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Pre-coated

Thomas Ship



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Alloy • Lacquer Coated in Colors • Spring
Steel • Alloy Strip Steel, SAE Grades •
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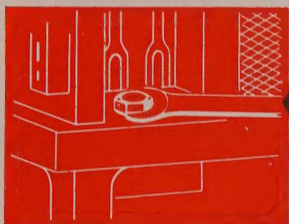
SAFE ASSEMBLY—There is a Spring Lock Washer on every critical part. Spring Lock Washers do not come off and be swept away with the waste—losses are eliminated.

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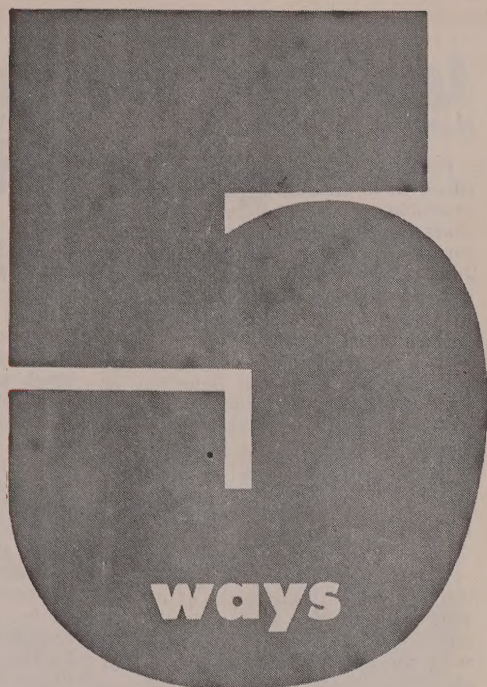
CORRECT ENGINEERING—A standard ASA Spring Lock Washer on each type of bolt or screw prevents criticism and complaints, increases customer acceptability and service of your product. Spring Lock Washer Shank Fit allows freedom of washer movement in application.

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Materials To Be Had

Readers Service Department has asked us to announce that stocks are available on several items. The flow chart of the steel industry for 1948, compiled by our Pittsburgh editor, Joe Sullivan, and published last week in the book, is available for free. Also available at no cost are copies of the special insert on steel industry statistics. At a buck per copy, you can buy the Guide to the Selection of Tool Steels and Carbides, while for a quarter there are available copies of the Steel Industry's New Pricing System.

In 1899 They Were Wrong

Going back a half century we find the weather the big topic of discussion. Pittsburgh is practically cut off from the east, and activity in the steel and iron plants has been cut sharply. Pennsylvania railroad announced no material would be accepted for shipment out of Pittsburgh. But the real news of the week is a minor item to the effect that Mr. Andrew Carnegie is a bit satirical in commenting on the fanciful story that a \$400,000,000 corporation is to be formed to take over the Carnegie Steel Co. and all the other steel plants in sight. The editors apparently agreed—they predicted any such move would be long deferred. Actually, it was deferred only 23 months, and the capital was \$1,100,000,000 instead of the \$400,000,000. It was just as hard to look ahead a half century ago as it is right now!

International Effects

In Belgium, in Spain and in Mexico there are steel mills operating as a result of a single story in this book. It all started when our Steel Plant Editor, John Knox, discovered an unusual process being used in a mill down in Dixie. Instead of pouring from the furnaces into ingots and then breaking the ingots down into billets, this mill poured the billets direct. It was well adapted to merchant mill techniques, and our Mr. Knox, who knows a steel plant story when he sees one, promptly rushed it into print. Some time later, the operators of the mill received a cablegram from Belgium. A Belgian steel man had seen the article, was much interested, and asked permission to come over and see the opera-

tion. Permission granted, he came at once and spent six weeks studying the mill. He collected the necessary data, returned to Belgium, and built a mill just like the American one. Shortly after that, a mill operator in Northern Spain had the same idea, wrote to the American mill operator quoting from our article, and was told he could see the same thing in Belgium. He went, looked, returned and built. A little later on, a large black sedan with a roof-top baggage rack piled halfway to heaven with luggage rolled up to a stop in front of this southern steel plant, and three men from Mexico got out. They, too, had seen the STEEL article, were interested, and had driven a couple of thousand miles to see the plant. After they followed the same routine as above, a mill started operations in Mexico. How long this chain goes on we don't know. All we know is that sometimes we are a little awed by the effects of the things we publish!

Well, Why Not?

William Feather, one of our favorite authors, asks in the February issue of his magazine why somebody doesn't write a novel about a flat-chested heroine for a change.

Puzzle Corner

According to Ralph Pappeneheimer of Cincinnati, and he's right, a spear will bring 5 coconuts; a knife, four; and a fishhook two. That answers our puzzle of two weeks ago, and brings us to this one: A man who lived in Chicago was changing from 1948 to 1949 license plates and inadvertently put the new one on upside down. When he noticed his error, he also noted that his license read upside down was 78,633 higher than in its proper position. What was his number? We also have a rather difficult geometrical problem which we will ask you this week but we are not going to publish the answer. It's too long, but we'll be glad to mail it to anyone who wants it. The problem is to prove that the intersections of the trisectors of the angles of any triangle form an equilateral triangle.

Shradu

(Editorial Index—page 47)

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Wellman will build it

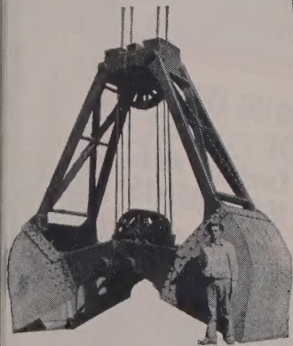
Special Cranes
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For fast and efficient action



One of two 6-ton Coal Handling Bridges in this installation.

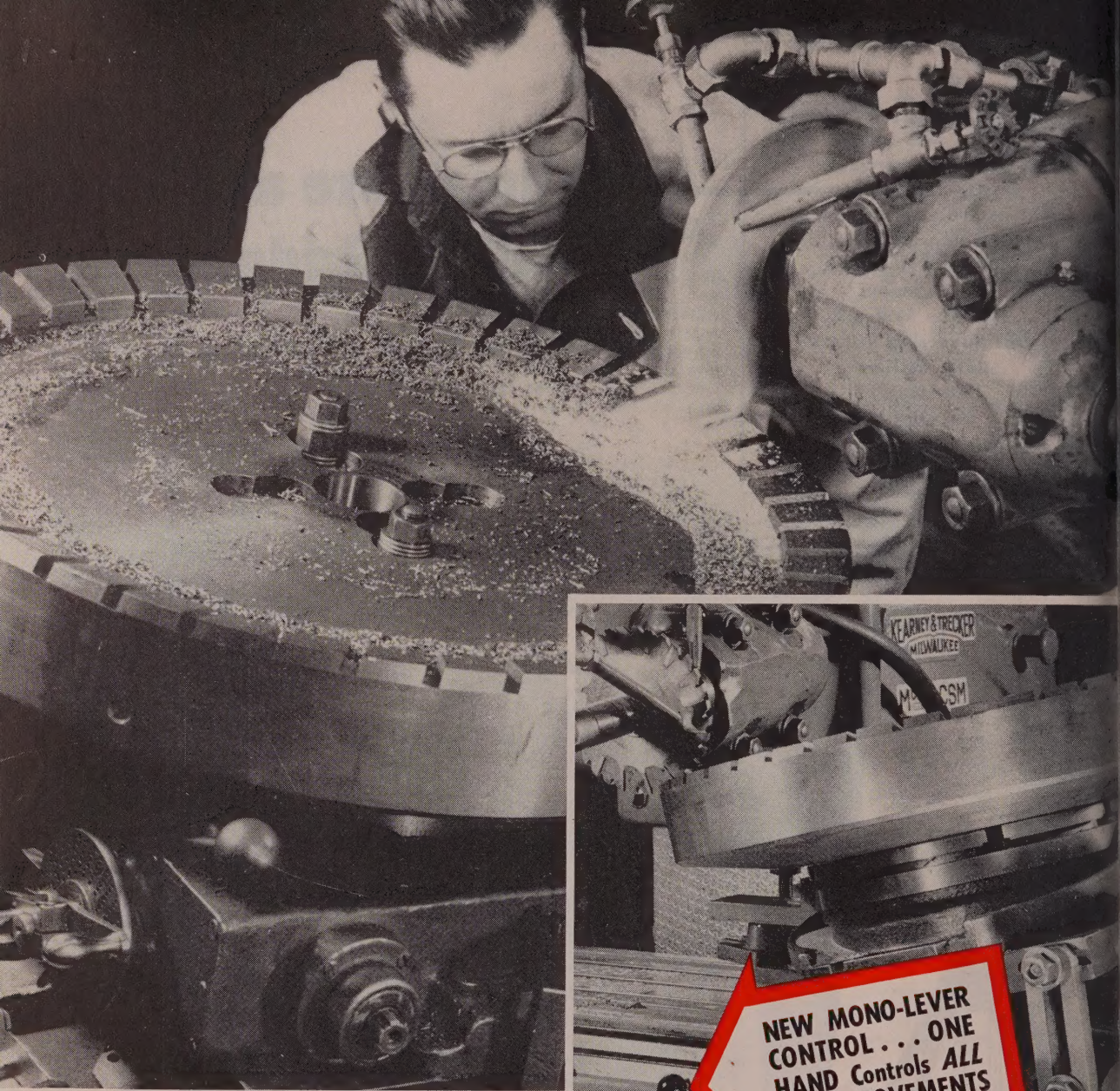


6-ton Wellman Williams Type Coal Bucket used with these bridges.

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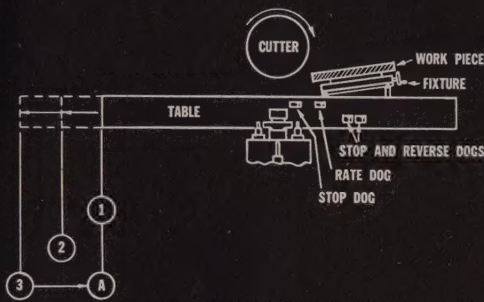
Here are two views of a typical job shop or tool room operation on a Kearney & Trecker Automatic Cycle milling machine. Note special set-up using milling attachment to mill compound angle slots used for inserted teeth in large cutter body. *Mono-Lever* Table Control lets operator give maximum attention to cutter and workpiece — that means less idle cutter time — less operator fatigue — and most important 22% savings in floor-to-floor time for this job!

**NEW MONO-LEVER
CONTROL . . . ONE
HAND Controls ALL
TABLE MOVEMENTS**

In face of rising costs . . . **CAN YOU
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HOW JOB IS DONE

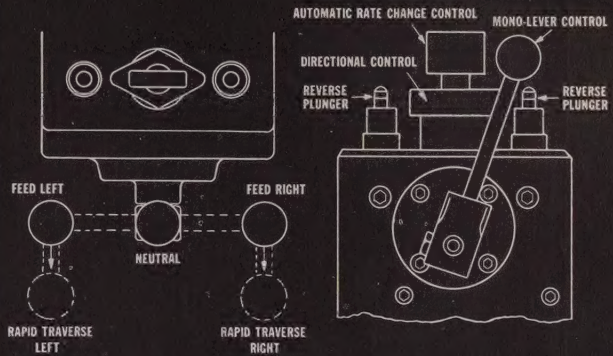
USING AUTOMATIC TABLE CYCLE AND MONO-LEVER CONTROL



Operator engages Mono-Lever. Table advances in rapid traverse to point of cut (2). Stop dog changes rapid traverse to feed for cut. Table feeds through cut to (3). Stop and reverse dogs reverse table in rapid traverse back to starting point (A) to stop. Operator indexes workpiece and repeats cycle.

HOW IT WORKS

AUTOMATIC TABLE CYCLE and MONO-LEVER CONTROL UNIT



ARE LOOKING at a diagram of the job at the left. See how Mono-Lever Control and Automatic Table Cycling make it easy for the operator . . . speed up production. No wonder we report 16 to 31% savings in cycle time alone.

YES! Kearney & Trecker's constant research and development program—always directed at getting greater production at lower costs—has found what you have been looking for.

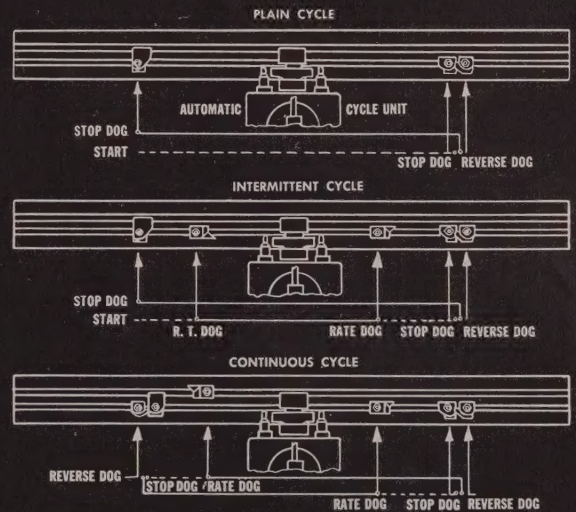
They're new knee type milling machines that combine mass unit production and versatility for general purpose and job shop work. Kearney & Trecker Milwaukee knee-type milling machines equipped with Automatic Table Cycle and Mono-lever control *do just that*. They offer you *right now* the opportunity to mill *more units with more profit in less time*.

Of equal importance to you is the opportunity for proper machine selection. You neither *over-buy* nor *under-buy*, but you buy *right* when you choose from the 56 machines in this new Kearney & Trecker line.

For some startling facts about these machines and their application to your milling work, consult a Kearney & Trecker Sales Representative today. He's been schooled in the "know-how" and he's at your service. For detailed information, contact him or write us direct. Ask for catalog No. AC-10A. Kearney & Trecker Corp., 6784 W. National Avenue, Milwaukee 14, Wisconsin.

THINK OF IT! Now you can have all the advantages of this great cost-cutting feature plus the all-around versatility of general purpose, knee-type machines . . . faster, easier control for greater production with less operator fatigue.

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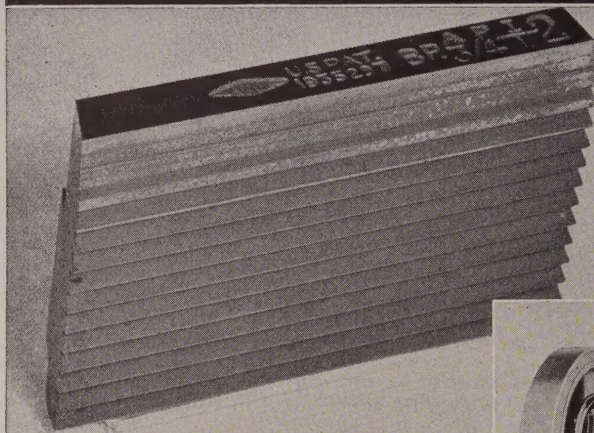


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UP TO 31% OR MORE?**

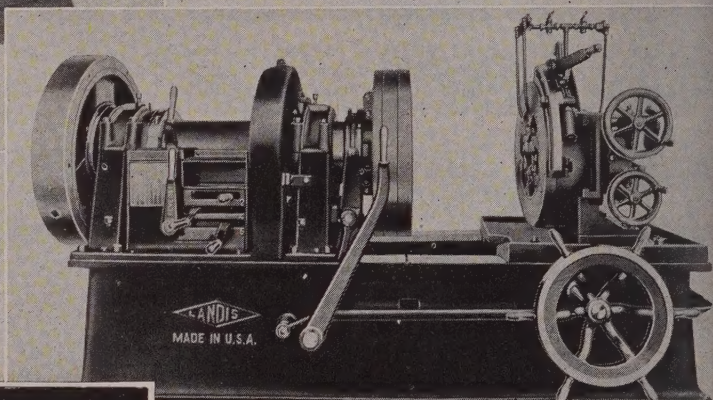
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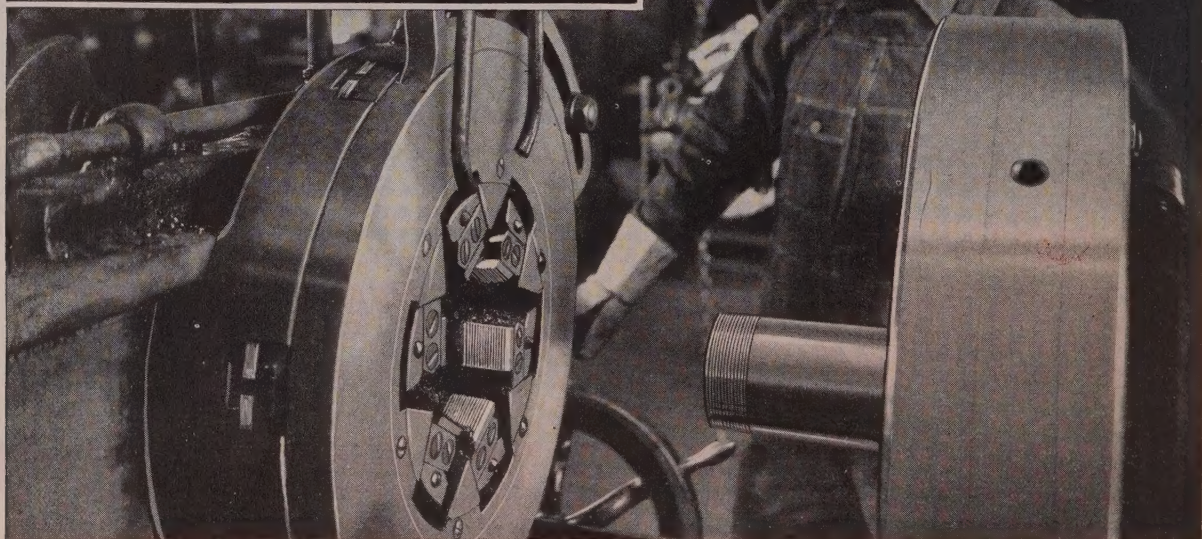


Landis Tangential Pipe Chasers employed in Stationary Head—one set chasers required to cover range of die head—eliminates the changing of chasers for each diameter of threads produced—assuring accurately formed threads and low threading cost.

The Landis Stationary Die Heads applied to our Pipe Threading and Cutting Off Machines minimize spoilage—insure high degree concentricity due to floating action of die head in T-slot of cross rail.



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How To Get Results from
Applied Flow Analysis

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STEEL

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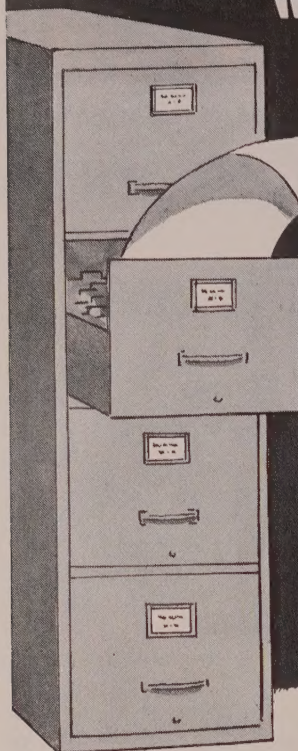
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"We know you can't take a 'thank you' to the bank and borrow a dime on it, nevertheless we want to express our appreciation for services well rendered."



Quotation Reproduced From A Letter in Our Files

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OUR CUSTOMERS' MAN

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"We feel we have been given a fair share of materials . . ." "Your steel is preferred by the men in our shop" . . . "Your service far above the average warehouse in this area" . . . "Your timely assistance kept our plants operating" . . . "You have been doing everything possible under present conditions" . . . "In a pinch we can depend on Reliance coming through" . . . "You have gone all-out" . . . "You helped us out of a bad situation." . . . etc. . . . etc.

Reliance is constantly planning and working toward greater production and supply . . . towards higher standards of steel service.

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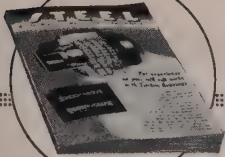
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AS THE EDITOR VIEWS THE NEWS

February 14, 1949

Deficit in 1949?

Not long ago the Department of Commerce issued an official forecast that there would be an apparent deficit of 7 million tons in the supply of finished steel in 1949. It estimated demand at 75 million tons, including domestic demand of 70.8 million tons and foreign demand of 4.2 million tons. It predicted supply at 68 million tons.

In view of the present easing of activity in some steel consuming industries, it may be well to check this forecast against the latest evidence. Almost everyone will agree that the estimate of 68 million tons of finished steel production in 1949 is realistic. If demand warrants it and if no serious strikes or shortages intervene, the industry should be able to turn out 68 million tons or more.

Also, the estimate of 4.2 million tons of foreign demand seems reasonable. Exports to non-ECA countries have been declining and may continue to do so. Exports to ECA countries may be offset in part by the increasing output of foreign steel producing countries.

However, the department's figure of 70.8 million tons of domestic demand is open to question. Since early last November every week has witnessed evidence that the pipe lines of distribution are being filled and that one by one some of the steel consuming markets are reaching the stage where the accumulated demand of the past is being satisfied. There are positive signs that the lush market supported by buyers with ready cash and urgent needs is disappearing rapidly and that henceforth the support must come from buyers who must purchase carefully, with discrimination as to values.

This adjustment is removing considerable froth from backlogs on steel mill order books. This clean-up process, coupled with sustained record-breaking production for six weeks at an annual rate of 71 million tons of finished steel, means that delivery periods on many steel products will be shortened appreciably.

It is too early to estimate the net result of this current shakedown in demand. When all of the water has been squeezed out, we probably will find that we still have a substantial, gratifying demand, but that the deficit in supply, if any, is not as great as the Department of Commerce predicted.

* * *

AUTO MARKET CHANGING: Motordom is in the process of diagnosing the present signs of softness in the automobile market. Buyers are shying away from some of the larger and higher-priced models. Observers are divided as to whether this condition is seasonal or whether it means automobiles are on the verge of a buyer's market.

If it turns out that the latter is true, then there may be a gradual shift in the proportion of cars built by the "big three" and by inde-

pendents. Prior to the last war, General Motors, Ford and Chrysler were accounting for about 90 per cent of all sales of motor cars. During the postwar period to date, sales by these three have averaged about 75 per cent of the total.

The advantage of General Motors, Ford and Chrysler in a buyer's market stems from the fact that historically Chevrolet, Ford and Plymouth have been the most popular makes. However, the independents—including Hudson, Nash,

(OVER)

AS THE EDITOR VIEWS THE NEWS

Packard, Kaiser-Frazer, Studebaker and Willys-Overland among others—have carved out definite areas of preference among customers and may be expected to compete aggressively in the approaching buyer's market on the basis of what they have learned during the past three years.

In any event, it would appear that in the near future most automobile manufacturers will be competing for the favor of the buyer who has in mind a limited number of dollars he can afford to pay for private transportation. —p. 69

* * *

WHO IS BETTER JUDGE?: A peculiar situation has arisen in connection with the railroads' freight car building program. Col. J. Monroe Johnson, chief of the Office of Defense Transportation, has warned the Association of American Railroads that he will withdraw government assistance in obtaining allocated steel for car construction unless more new car orders are placed by the roads.

The backlog of freight car orders stood at 119,711 a year ago, 134,676 on May 1, 1948, and 96,214 as of Feb. 1, 1949. According to Colonel Johnson, only 563 freight cars were ordered last month.

The warning of ODT poses a pertinent question: Who is in the best position to judge when and how many cars the railroads should order—a government official or the management of a railroad who is responsible to owners and customers for making a correct decision?

—p. 61

* * *

COMPETITION IS CURE: News from Europe reflects a growing interest in greater efficiency in manufacturing. In Germany a trend toward profit-sharing is gaining momentum. In Norway a training-within-industry program has been adopted to spur production. In France two large metallurgical companies are pooling their technical resources for more effective operation.

These are wholesome signs of recovery. They indicate that manufacturers realize that there is room for improvement in plant efficiency. When American visitors, including Wilfred Sykes, president of Inland Steel Co., observe that many German practices and much equipment now in use in the Ruhr went out of vogue in the United States 30 years ago, it is easy to understand why European management is seeking greater efficiency.

Why did foreign industry lag so far behind in the period between the wars? Was it be-

cause cartels and similar devices deprived executives of European companies of the stimulating incentive of rivalry which is provided by keen competition? —p. 65

* * *

ECONOMIC MISSIONARY: Reports from Washington indicate that business observers in that city are favorably impressed with the possibilities of President Truman's "bold new program" for helping people all over the world to enjoy a higher standard of living. They see in it a chance to add greatly to the prestige of the United States as the fountain head of everything that makes for better living conditions. They also envision it as a powerful weapon against communism.

Businessmen who like to form conclusions independently of Washington opinion doubtless will agree that Mr. Truman's dream has attractive possibilities, but they will want assurances that it is not going to be used as a vehicle for building up a new top-heavy bureaucracy and for spending additional money recklessly. Before we authorize the government itself to act as a global economic missionary, would it not be wise to see what private initiative, skill and money can do with the help of a more favorable government attitude toward private business? —p. 62

* * *

30 STEEL HOMES DAILY: Following a long period of organizing, financing, designing and tooling-up, the Lustron Co. is all set to start turning out porcelain-enameled steel houses on an assembly line basis at the rate of 30 units per day. Plans call for stepping up output to 75 per day in April and 100 per day in mid-July.

Each house requires 10 tons of steel and 2 tons of other materials. Sufficient steel already has been allocated to Lustron to permit construction of 4500 houses. The current Lustron model is a five-room, basementless, ranch-type structure, the cost of which—erected on a purchaser's lot—ranges from \$8300 in Columbus, O., to \$9300 in New York.

Industry will watch the progress of Lustron closely, because its plan for building and selling pre-fabricated houses probably is the most ambitious of the several that have been proposed since the end of the war. —p. 67



EDITOR-IN-CHIEF

UNEMPLOYMENT RISING—Several consecutive months of increasing unemployment emphasizes that a considerable portion of the abnormal postwar demand for goods has been satisfied and that industry and employment are trending toward more normal conditions (p. 55). Although the January increase in number of people looking for jobs was the sharpest since the end of the war, employment is still high. Only 4.4 per cent of the civilian labor force is out of work, compared with nearly 15 per cent in 1940 . . . Producers of primary metals are maintaining employment at a high rate and the steel industry reached a postwar peak in December (p. 56) . . . "Maladjustments" in the economy contributing to unemployment are receiving the attention (p. 56) of administration economists.

CONTROLS—Development of more soft spots in the economy is lessening demands in Washington for mandatory controls over materials (p. 57) and prospects now are for continuation and possibly extension of the voluntary allocations program. Steel may be the only important material involved in the program, although the current temporary shortage in aluminum is being studied . . . Railroads have been warned that unless they step up ordering of new freight cars, government assistance in obtaining steel may be reduced (p. 61).

"RAILROAD OF TOMORROW?"—An 103-mile elevated belt conveyor system designed to carry iron ore, coal and limestone between Lake Erie and the Ohio river (p. 60) is planned by Riverlake Belt Conveyor Lines Inc., a new corporation. The project is estimated to cost \$210 million, would require three years to build. Important savings in carrying charges are claimed by the project's backers, who describe the elevated bulk cargo conveyor as the "railroad of tomorrow."

HELP FOR ALL—President Truman's "Point Four Program" to help peoples all over the world achieve a high plane of living is seen by Washington business observers as having important implications for business, somewhat similar to the European Recovery Program (p. 62). Details of the plan are still hazy, but are expected to take more definite form within the next several months as the program is worked out by an interdepartmental committee headed by Willard Thorp of the State Department.

AUTOS ENTERING BUYERS' MARKET—Buyer resistance to the heavier and higher-priced automobiles is becoming more evident and many believe motor cars definitely are entering a buyers' market (p. 69). Used car prices are down sharply and activity is slow. Dealers are faced with the problem of retraining salesmen to sell. Meanwhile, production schedules hold to levels higher than those of 1948.

UNIQUE TRAILER—Lustron Corp., builder of prefabricated steel houses, will use 700 heavy semi-trailers, on each of which all the components of a complete home can be packed at the factory and hauled to the building site (p. 67). House is assembled as the parts are removed from the trailer.

FOREIGN—Profit-sharing plans, training-in-industry programs and various other means to increase production are being tried in western Europe (p. 65). Many of these plans are modeled after American systems and are designed to improve efficiency and productivity, still lacking in many European factories.

HERE AND THERE IN INDUSTRY—Electrical equipment backlogs, abnormally large since the war, are being reduced rapidly (p. 56) . . . Mon C. Wallgren, former senator from and governor of the state of Washington, has been appointed chairman of the National Security Resources Board (p. 64) . . . General Motors has moved production of diesel switching locomotives from LaGrange, Ill., to Cleveland (p. 72) . . . Stainless steel exports to Europe are expected to be increased 25 per cent during 1949 (p. 59) . . . Stoker manufacturers are looking forward to a substantial increase in 1949 sales (p. 56) . . . Larger tonnage of finished steel products was shipped into consumption last year than ever before (p. 58). Total for the year amounted to 65,973,138 tons.



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More People Looking for Jobs

Unemployment rises 700,000 in January, for sharpest increase since war's end. Percentage of jobless, now 4.4 of labor force, far below prewar normal. Productivity improves

STEADY rise in unemployment since last October is being watched by metalworking executives with interest, but few believe the number of jobless will reach alarming proportions in the months immediately ahead.

From December to January, total unemployment jumped 700,000, the most abrupt rise since the end of the war. Since last October, the number of persons seeking jobs has increased slightly more than 1 million to a total of 2,665,000 persons in January.

Prospects are that unemployment will continue to rise at least through February and some metalworking executives believe the total may reach 4 million by mid-year. A few see possibly 5 million jobless by July 1.

A portion of the increase in persons seeking jobs is ascribed to seasonal factors, such as the reduction in construction and other outdoor work. The January increase, however, is considerably above the seasonal normal and reflects to a large extent cutbacks in production caused by soft

spots appearing in the demand for goods.

Below Prewar Normal—Today's unemployment figures out to 4.4 per cent of the total civilian labor force of 60 million. In 1940, unemployment averaged 14.6 per cent of the civilian labor force and slightly more than 8 million out of a labor force of 55 million were looking for jobs.

Even should unemployment rise to 4 or 5 million by mid-year, as some observers believe it will, the percentage of the labor force looking for work would be only 6.5 to 8 per cent, still far below the prewar normal.

Some Favorable Aspects — The shaking out of the labor force necessitated by softening in demand for goods has some advantages to employers. Many now are able to weed out the submarginal employees they were forced to take on during the height of the labor stringency. Employees are reported to be giving greater attention to productivity and are becoming more amenable to man-

agement supervision and discipline.

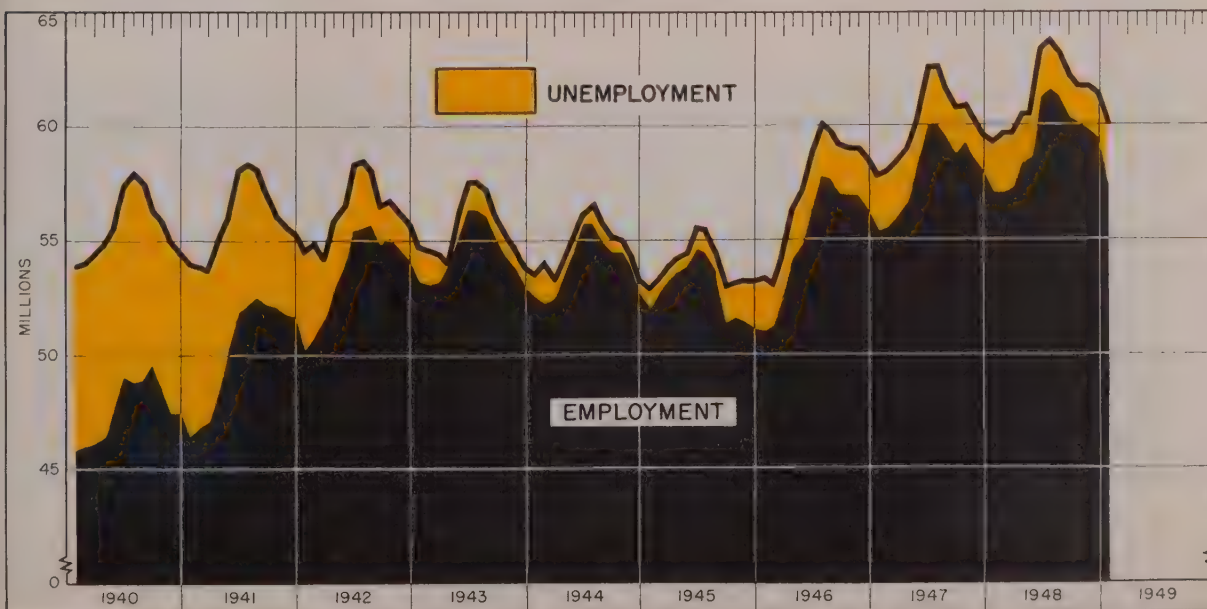
Layoffs Widespread — A quick check by STEEL's district editors reveals that practically every large metalworking district has been affected by declining employment. The bulk of layoffs occurred in the textile-leather-apparel group of manufacturers, the construction industry and to a lesser extent in such metalworking industries as foundries, household appliance manufacturers, railroad shops, and certain other fabricating plants.

At Pittsburgh, an estimated 5000 workers have been furloughed by metalworking companies during the winter months. Many of the layoffs have occurred among relatively small shops. A scarcity of aluminum ingot due to the power shortage in this country and Canada has necessitated curtailment by aluminum plants and the leading company has furloughed about 1000 men; these are expected to be recalled as soon as the spring thaws permit an increase in aluminum output. Declining traffic has caused the layoff of at least 1200 railroad workers.

At Buffalo, employment is estimated at only 2000 below the postwar peak and steel mills and many of the larger foundries are maintaining operations at capacity. New York Central has closed its East Buffalo car shop.

Philadelphia district unemployment

EMPLOYMENT-UNEMPLOYMENT SINCE 1940



continues to increase, although primary metal plants are operating at capacity.

New York-New Jersey area is experiencing a general decline, with casting shops, makers of appliances and components, and railroad shops, among those furloughing workers or operating on a shorter work-week.

Cleveland plants generally experienced a slight decline in January and expect a further February dip.

Chicago district and downstate Illinois have been experiencing several consecutive months of employment downturn. Generally the larger companies are maintaining work forces intact, while some of the smaller plants are forced to lay off employees. Many employers believe situation is temporary and expect a pickup in the spring. Some find productivity is increasing as result of job competition. Turnover is lower.

Employment in the Birmingham area declined 2585 from December to January, the majority being in retail trade and service establishments.

West Coast unemployment has increased to 500,000 although employment now totals about 4 million, compared with 8 million before the war. Manufacturing employment dropped 12,000 in December, but remains 100,000 above like 1947 period.

Steel Payroll Exceeds \$2 Billion

ANNUAL payroll of the iron and steel industry exceeded \$2 billion for the first time in 1948 and was 200 per cent higher than the 1937-1938 average. Estimated total was \$2,234,461,000, an increase of 12 per cent over 1947.

Both employment and wage rates rose last year. Employment rose from 690,000 in December, 1947, to 647,600 in December, 1948, and the average for the year was 635,600.

At the close of 1948, wage earners were averaging \$1.60 an hour, compared with \$4 cents an hour in 1939.

Cites Economic "Maladjustments"

SIX "serious and fundamental" maladjustments in the nation's economy are producing unemployment and business hesitancy and unless corrected can dim a currently bright economic outlook.

This was the warning given before the Senate-House Economic Committee last week by Leon Keyserling, vice chairman, Council of Economic Advisers.

The six elements cited were:

1. Lag between consumer income and the amount of goods and services it will buy. Living costs have

risen 74 per cent since 1939, with 29 per cent of the increase occurring since mid-1946. Mr. Keyserling questioned whether consumer purchasing power under these circumstances will expand enough to absorb the normal annual 3 per cent increase in national output.

2. Disparity between industrial prices and farm prices.

3. Sharp and continued increases in the prices of certain vital industrial products, including fuels, lighting materials and house furnishings. Prices of metals and metal products, the President's adviser said, increased 6.7 per cent in the second



LEON KEYSERLING

half of 1947, 4.6 per cent in the first half of 1948, 9.7 per cent in the second half of 1948, and 2.4 per cent in January. Zinc and lead were mentioned especially as increasing sharply.

4. Drop in consumer expenditures and demand in relation to total national output. In 1929, consumers took 76 per cent of total output, but only 70 per cent in 1948.

5. Corporate profits are higher than necessary to maintain current levels of business investment.

6. Some basic industries, such as steel, aluminum and electric power are not expanding basic capacities sufficiently to attain production levels needed by an expanding economy.

Electric Equipment Backlogs Fall

ABNORMAL postwar backlogs of orders for most electrical equipment

are being rapidly reduced to normal levels, according to Tomlinson Fort, manager of central sales for Westinghouse Electric Corp.

Mr. Fort told a gathering of public utility buyers of the National Association of Purchasing Agents that at the beginning of 1947 there was a backlog of orders for 2.6 million electric motors of standard sizes. The backlog now is 300,000.

Stoker Sales Gain Expected

MANUFACTURERS of underfeed stoker equipment expect their sales volume this year will better that of 1948. Poll of delegates attending the winter conference of the Stoker Manufacturers Association at La Salle Hotel, Chicago, showed a diversity of opinion as to anticipated sales increase, predictions ranging from moderate to substantial gains over the approximately 90,000 units sold last year.

The average increase indicated was approximately 33 per cent on a unit basis with a possibility of the dollar volume exceeding this percentage increase slightly, depending on the need and demand for stoker equipment used in commercial and industrial plants.

Steel Supply Conditions Spotty

ALTHOUGH signs are increasing of easing supply conditions in the steel market (STEEL, Feb. 7, p. 61), the improvement is far from universal with numerous complaints of continued acute shortages reflecting the spotty situation prevailing.

Many metalworking firms are reporting quicker deliveries from the mills and warehouses and substantially improved inventories as compared with six months ago. On the other hand many other consumers complain they cannot get enough steel to care for their current requirements.

One of these latter is a Milwaukee firm which insists that reports of easier supply conditions are false and misleading based on its experience.

This company buys from four mills in the Midwest which allot tonnage based on the consumer's purchases in the period 1936-1940. However, the company's allotment from all four mills for the first four months of this year is only 50 per cent of what it was in 1948. Actually, it is receiving under the allotment system about 2000 tons of steel whereas actual orders on hand call for an additional 5000 tons.

Stopgap Allocations

Extension to Sept. 30 merely an interim measure until long-range program is formulated

INTERIM extension through Sept. 30 of the voluntary allocations agreement method of assuring supplies of scarce materials for essential purposes is merely a stopgap measure to serve while the administration and Congress work out a complete program of long-range, anti-inflation controls.

What controls will be authorized by this long-range program? It still is too early to tell, but one thing is sure; Washington brass hats and members of Congress are increasingly impressed with the development of soft spots in the economy, and are less inclined than a few months ago to favor the use of drastic mandatory controls.

Pressure Fades—A check in the Office of Industry Cooperation—government agency for the negotiation of voluntary allocations agreements—reveals the pressures of last year for scarce materials are not now present. There still is a shortage of steel, but the situation presents less of a problem to consumers. The outlook is that voluntary allocations agreements now in effect will be continued and that possibly one or two or three new ones will be added.

Expectations are steel will continue to be the only allocated material. While Secretary of Commerce Sawyer told Congress a study of aluminum would be made to determine whether allocation of that metal

is desirable, there is no immediate prospect for aluminum preferences.

Heat Is Off—The heat is off copper, lead and zinc as far as contemplated allocations agreements are concerned. Producers of these metals who were called in by the OIC to discuss allocations for building up the Munitions Board's stockpiles told the government men that stockpiling needs could best be filled by individual deals between producers and the Bureau of Federal Supply. As a result, contracts were negotiated—and the stockpiling officials are entirely satisfied with the shipments they have been receiving.

Programs Under Study—Here are the suggested allocations programs which the OIC now has under study:

1. **Economic Cooperation Administration** which some months ago put in an estimate of 1949 steel requirements of around 2 million tons was asked by the OIC to submit a breakdown by finished products. This has proved a tough assignment for ECA which, however, now hopes to submit the breakdown within "a few weeks." However, even if an allocations agreement is reached on behalf of ECA, it will not mean any additional big drain on steel supply, for ECA-approved steel purchases have been made right along without allocations over the past year.

Incidentally, OIC does not expect steel exports from the United States to be much greater this year than in 1948. Secretary Sawyer's estimate of steel exports in 1949 is around 4,200,000 tons.

2. Continuing the controversy between the Commerce and Interior Departments over oil country tubular

goods and line pipe, Secretary Krug has again taken the position voluntary allocations agreements should be set up in those fields. But no such action is expected, at least immediately, for Commerce continues to feel allocations would bring no change in the supply situation in these products. Commerce estimates that in oil country tubular goods production will be equal to demand in 1949. Commerce reports line pipe production in 1948 was 240 per cent higher than the prewar average, and estimates that in 1949 it will be 248 per cent higher—and Commerce sees no way of improving this situation through voluntary allocations.

Storage Tank Steel—3. Last year an agreement calling for allocations of 16,000 tons of steel monthly for terminal and bulk oil storage tanks was explored but action deferred. These needs are being re-studied and the matter will come up for further consideration with the steel producers.

4. The OIC is prepared to act speedily on calls by municipalities and institutions for spot assistance in obtaining needed materials. Last year a number of such calls were satisfied by arranging private deals between steel producers and the buyers. Included were several tonnages of water pipe and some steel for bridges and similar purposes. No new sizable demands are pending in this category.

5. Some suggestions for allocation agreements to provide steel for certain housing items—as boilers, convector radiation, space heaters, ice boxes, etc.—are still before the OIC, but they are not active.

The organizational setup of the OIC continues, through Sept. 30, the



SERVICE RECORD OF 117 YEARS: At a recent presentation of service pins, Mesta Machine Co., Pittsburgh, revealed that the Weir brothers—Walter, Frank, Robert and William—machine shop foreman, ma-

chinist, chief foundry schedule clerk and assistant auditor, respectively, have massed a family service total of 117 years with the company. The father of these men recently retired from Mesta

same as at present with Earl W. Clark as director and A. A. Wagner as chief steel consultant.

NACA Steel Needs Considered

PUBLIC hearing on a proposed amendment to the voluntary plan providing steel for requirements of the National Advisory Committee for Aeronautics will be held Feb. 14 by the Office of Industry Cooperation.

The proposed amendment will make benefits of the plan available for requirements of the Civil Aeronautics Administration, and will provide an additional 250 tons of steel products monthly, beginning in March, for that purpose.

The following approximate amounts of steel products will be made available under the proposed amended plan:

Type	Net Tons per Month NACA CAA Total		
Hot Rolled Bars	10	20	30
Reinforcing Bars	530	10	540
Structural Shapes	600	110	710
Plates	575	5	580
Sheets	86	90	176
Rails	11	..	11
Seamless Pipe and Tubing	80	..	80
Rigid Conduit	34	15	49
Total	1926	250	2176

Steel Shipments Record-Breaking

Final figures for 1948 show movement of finished products to consumers exceeded wartime peak by 2,722,619 tons. Chief gains scored in sheet and strip

LARGER tonnage of finished steel products was shipped into consumption last year than ever before in history.

Final figures for the year, just compiled by the American Iron & Steel Institute, show 1948 deliveries of finished steel totaled 65,973,138 net tons, which was 2,916,000 tons more than delivered in 1947, and 2,722,619 tons above the wartime record of 63,250,519 tons set in 1944.

In December, shipments amounted to 6,056,282 tons, exceeding the movement to consumers in the like month of the preceding year by more than 400,000 tons and surpassing the record of last March by 78,000 tons.

More Flat-Rolled—During 1948, the greatest increase in tonnage shipments over 1947 was in sheets and strip, the total being 19,743,338 tons, a gain of 1,383,991 tons. Substan-

tial increases also were made in pipe, plates and tin plate. Shipments of nails, alloy steel bars and reinforcing bars showed small gains over 1947.

January Steel Output Rises

STEEL production in January exceeded 8 million tons for the first time in history, totaling 8,172,236 net tons, more than was produced in any other country in the world last year with the exception of Great Britain and Russia. The new high represented an increase of 401,000 tons over December and was nearly 700,000 tons more than in January, 1948.

Pipeline Authorizations Large

NATURAL gas transmission facilities designed to increase the capacity

SHIPMENTS OF STEEL PRODUCTS FOR DECEMBER AND ALL OF 1948

Steel Products	Number of Companies	Items	December—1948				Whole Year 1948				Whole Year 1947			
			Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale)		Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale		Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale)		Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale		Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale)		Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale	
			(Net Tons)		(Net Tons)		(Net Tons)		(Net Tons)		(Net Tons)		(Net Tons)	
			Per cent of Total Shipments		Per cent of Total Shipments		Per cent of Total Shipments		Per cent of Total Shipments		Per cent of Total Shipments		Per cent of Total Shipments	
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	45	1	293,593	4.9	278,686	4.8	3,150,754	4.8	3,270,644	4.7	2,965,748	4.7	2,396,343	
Structural shapes (heavy).....	12	2	393,884	6.5	3,088		4,255,355	6.5	25,961		4,436,129	7.0	2,640	
Steel piling	4	3	30,483	0.5			299,537	0.5	1,435		324,224	0.5	23	
Plates (sheared and universal).....	29	4	657,773	10.9	31,831		7,000,199	10.6	367,394		6,345,215	10.1	219,227	
Sheets.....	7	5	8,181	0.1	48,649		75,252	0.1	528,789		160,989	0.3	384,004	
Rails—Standard (over 60 lbs.).....	4	6	170,817	2.8	638		1,976,520	3.0	12,911		2,207,146	3.5	991	
—All other	5	7	19,034	0.3	193		214,880	0.3	1,228		211,900	0.3	329	
Joint bars	7	8	12,835	0.2	3,458		137,139	0.2	42,904		173,923	0.3	15,198	
Tie plates	7	9	41,651	0.7	17		489,434	0.8	386		504,779	0.8	4,437	
Track spikes	8	10	13,624	0.2	5		145,830	0.2	610		163,746	0.3	146	
Hot Rolled Bars—Carbon.....	34	11	557,316	9.2	54,803		6,196,444	9.4	623,717		6,242,416	9.9	745,770	
—Reinforcing—New billet	16	12	117,882	1.9	398		1,329,945	2.0	6,840		1,277,075	2.0	9,775	
—Reinforcing—Rolled	13	13	18,188	0.3			212,021	0.3			175,833	0.3		
—Alloy	27	14	187,797	3.1	20,900		1,927,309	2.9	226,018		1,741,432	2.8	212,382	
—TOTAL	44	15	881,183	14.5	76,101		9,665,719	14.6	856,575		9,436,758	15.0	967,927	
Cold Finished Bars—Carbon.....	28	16	124,595	2.1	438		1,349,719	2.0	6,534		1,426,701	2.3	9,249	
—Alloy	27	17	25,984	0.4	766		244,248	0.4	7,483		218,802	0.3	2,501	
—TOTAL	35	18	150,579	2.5	1,204		1,593,967	2.4	14,017		1,645,503	2.6	11,550	
Tool steel bars	18	19	7,185	0.1	14		88,376	0.1	1,458		87,279	0.1	1,670	
Pipe & Tubes—Butt weld	16	20	199,895	3.3	2,148		2,045,361	3.1	27,785		1,892,691	3.0	78,080	
—Lap weld	8	21	28,016	0.5			339,633	0.5	3		389,762	0.6	875	
—Electric weld	13	22	140,133	2.3	623		1,572,139	2.4	5,424		1,254,325	2.0	4,274	
—Seamless	17	23	268,818	4.4	15,076		2,924,416	4.4	168,298		2,581,106	4.1	157,208	
Wire rods	22	24	81,875	1.4	24,459		610,348	0.9	299,727		667,282	1.1	331,192	
Wire—Drawn	39	25	212,029	3.5	14,250		2,673,276	4.1	175,358		2,590,963	4.1	181,785	
—Nails and staples	17	26	72,906	1.2	576		89,540	1.3	12,508		799,436	1.3	8,481	
—Barbed and twisted	15	27	23,115	0.4	4		254,629	0.4	433		256,991	0.4	128	
—Woven wire fence	28	28	33,959	0.6	397		399,457	0.6	3,935		407,295	0.6	3,616	
—Bale ties	11	29	6,558	0.1			113,892	0.2			119,917	0.2		
Black Plate—Ordinary	9	30	80,587	1.3			821,398	1.3	654		801,745	1.3	2,033	
—Chemically treated	2	31	2,723				17,268				19,252			
Tin and Terne Plate—Hot dipped	9	32	221,432	3.7	41		2,167,912	3.3	300		2,093,149	3.3	228	
—Electrolytic	9	33	178,245	2.9			1,784,288	2.7	215		1,617,659	2.6	29	
Sheets—Hot rolled	32	34	707,486	11.7	59,083		7,786,076	11.8	642,222		7,891,798	12.5	578,426	
—Cold rolled	16	35	629,147	10.4	1,426		6,867,375	10.4	20,706		5,504,578	8.7	28,498	
—Galvanized	16	36	139,683	2.3	229		1,643,337	2.5	2,965		1,609,881	2.5	889	
Strip—Hot rolled	23	37	142,948	2.4	36,594		1,662,787	2.5	376,576		1,740,085	2.7	308,555	
—Cold rolled	24	38	154,518	2.6	2,533		1,783,383	2.7	24,701		1,613,005	2.6	28,030	
Wheels (car, rolled steel)	5	39	30,963	0.5	49		337,376	0.5	1,053		356,873	0.6	2	
Axles	5	40	20,424	0.3			215,905	0.3	143		185,019	0.3	53	
All other	41	41												
TOTAL STEEL PRODUCTS	140	42	6,056,282	100.0	601,182		65,973,138	100.0	6,887,118		63,057,150	100.0	5,717,765	

* Adjusted.

of the nation's pipeline systems by more than 600 million cu ft daily, and involving over 2000 miles of new pipeline were authorized by the Federal Power Commission during the six months, July 1 to Dec. 31, 1948.

Total estimated construction cost was \$191,382,265, of which \$139,749,872 was for major projects estimated to cost \$700,000 or more. The larger projects are expected to benefit 32 cities of 50,000 population or over in 12 states and the District of Columbia, as well as numerous smaller communities. The construction of these major projects will increase capacities of the systems involved by at least 580,100,000 cu ft daily.

Largest single authorization was for the El Paso Natural Gas Co. to construct about 720 miles of pipeline.

Stainless Steel Exports

To Europe expected to rise 25 per cent in 1949. Currently taking 5000 tons annually

IMPORTATIONS of stainless steel from the United States into Europe, now approximately 5000 tons, will be increased by at least 25 per cent by the end of 1949, according to Col. Robert Solborg, vice-president, Armco International Corp.

Colonel Solborg, whose headquarters are in Paris, arrived in this country last week to study the current steel situation and to investigate latest applications in the manufacture of stainless steel.

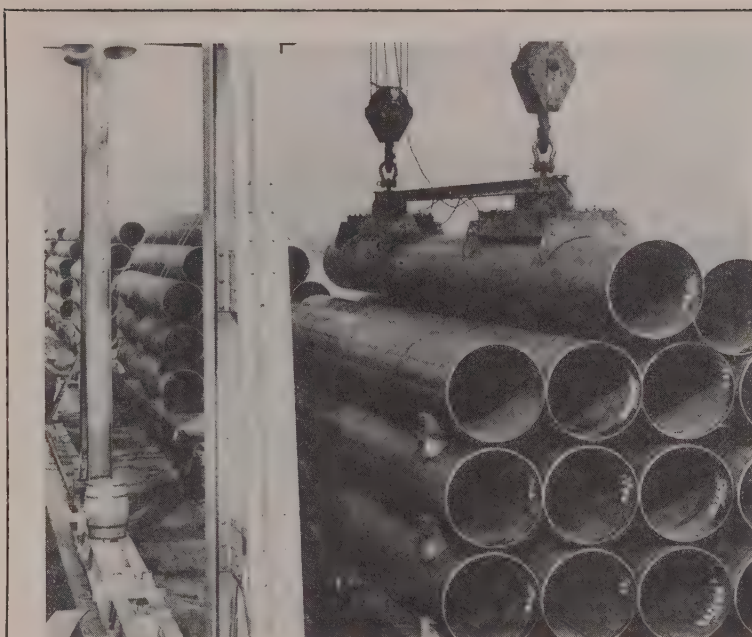
Europe is producing approximately 15,000 tons of stainless steel annually, Colonel Solborg said, and all of it is being put to industrial use. England, he added, is turning out more than 60 per cent of the stainless steel produced in Europe, but little of it is for export.

Expects Increase—By 1952 there is bound to be a vast increase in the steel production of Europe, he stated, particularly in view of the fact the United States is helping Europe to rebuild and to recover its economic stability. After they learn the "know how" of American production methods, they cannot be expected to buy as much steel from this country as during the period following the late war, he added.

"However," Colonel Solborg continued, "consumption of American stainless steel at the present time would be much greater if more 'purchasing dollars' were available."

Stockpiling Increases

NATIONAL stockpile of strategic materials has been greatly improved, but is still short of what it should be,



LOADING TRAINLOAD OF PIPE: A magnetic hoist is shown above loading the longest trainload of pipe ever hauled by the Santa Fe. Consigned to Transcontinental Pipe Line Corp. in Texas for construction of a line from Texas to New York, this initial shipment of 30-inch pipe is the first of 20,000 carloads. Pipe was fabricated by Consolidated Western Steel Corp., Los Angeles

the Munitions Board told Congress in its semiannual report for the last half of 1948.

All funds available for the fiscal year ending June 30, 1949, had been spent, obligated, or earmarked by Dec. 31, 1948. However, a better balance had been achieved, and stocks of most of the materials being stockpiled were on hand. Quantities in the stockpile of most of these materials were below what is considered essential for national security.

Deliveries Continue—During the last half of 1948, contracts were being let at the rate of \$67 million a month. The condition of the stockpile will be considerably better at the end of another six months when materials will have been delivered as the result of contracts placed as long as a year ago.

Due to supply shortages of a number of the materials sought for the stockpile, it has not been considered feasible to place contracts for adequate quantities of these for early delivery. Large purchases out of tight current stocks would have a tendency to increase prices. To avoid this effect, and to develop increased production, without sacrifice to the objectives of the program, contracts have been placed for longer term delivery.

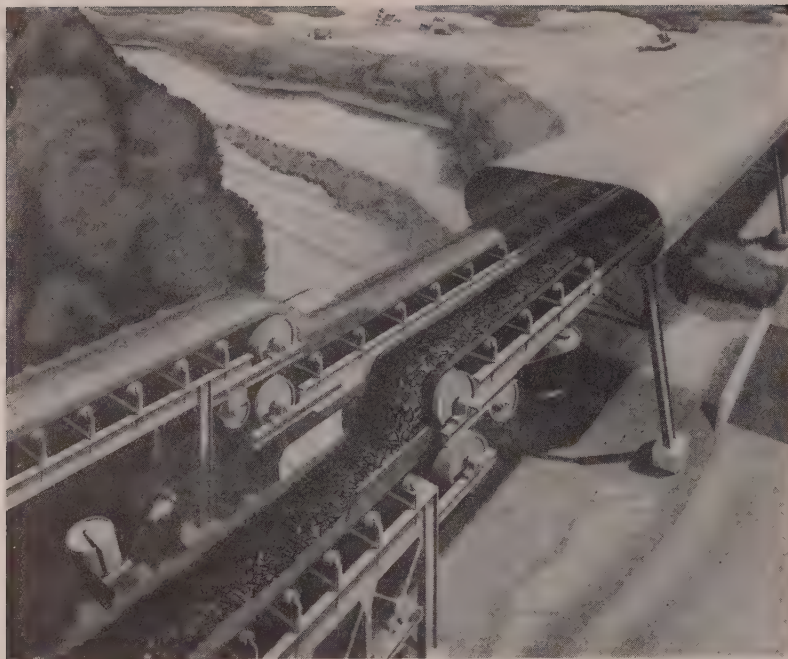
Competition Avoided—Although it

is no longer considered practical to purchase only materials which are surplus to current industrial needs, purchases in direct competition with commercial consumers are avoided where possible, the report added.

ECA Clears Metal Shippers

NO IMPROPRIETIES on the part of the United Kingdom, Netherlands or Belgium governments were involved in the aluminum and lead shipments to the United States in the first ten months of 1948. This previously stated position of the Economic Cooperation Administration has been confirmed by an intensive investigation just completed by the agency.

No evidence was found to indicate that any of the three countries was shipping back to the United States aluminum or lead, the import of which had been financed by ECA. A substantial portion of the United States imports of these metals recorded as coming from the United Kingdom and the Netherlands was actually in-transit shipments which had originated elsewhere. Much of the lead exported to the United States from Belgium was under the control of non-Belgian interests which merely used Belgian refining facilities in the processing of the concentrates en route to their destination.



Typical transfer point on lake-to-river conveyor line shows how coal and iron ore are relayed from one belt to another

Big Conveyor Line Projected

Plans announced for 130-mile belt system from Lake Erie to Ohio river carrying capacity loads of ore, coal and limestone at 600 feet per minute

AT NOON on Thursday last week, a group headed by H. B. Stewart Jr., energetic president of the Akron, Canton & Youngstown Railroad, filed incorporation papers at Columbus, O., for a new company—River-lake Belt Conveyor Lines Inc.—which plans construction of a \$210 million 2-way rubber belt conveyor line from Lake Erie to the Ohio river. Company offices will be at 12 E. Exchange St., Akron.

Southbound, the new line proposes to haul iron ore and limestone to steel mills in the Youngstown, Pittsburgh and Ohio river districts. Northbound, the line will haul coal to Youngstown, Akron, Cleveland and Lorain, O., and for transshipment to the Upper Lakes. Rates would be established considerably under those of the railroads, as well as under those for the lake-to-river canal which is still in the conversational stage.

As shown by the map, a 103-mile main line will extend from Lorain, O., on Lake Erie to a terminal near East Liverpool on the Ohio river. Spur lines will serve Youngstown and Cleveland, making total length of the system 130 miles. Moving at the rate of 600 fpm, total elapsed time from Lorain to East Liverpool will be only 15 hours 14 minutes.

Terminal Facilities—Modern, terminal facilities to save turn-around time for lake ore vessels at Lorain and for the handling of coal and ore at East Liverpool will be constructed as separate units. Another feature will be a coal washing plant to upgrade coal enroute. These facilities will take \$56 million of the total.

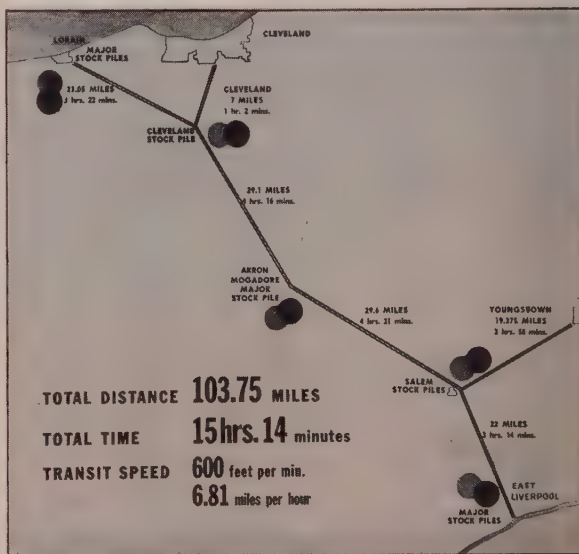
Map shows two-way main line of projected "rubber railroad" from Lorain, O., to East Liverpool, O., on the Ohio river, and spurs to Cleveland and Youngstown

Mr. Stewart said that minimum cargo volume required by the lines will be 30 million tons a year, possibly 15 million each of ore and coal, but total maximum capacity will be 52 million. Cost of the line can be paid off in 20 years and at the same time permit rates low enough to save from 50 cents to \$1 a ton on transportation of coal and from 47 to 68 cents a ton on iron ore to Youngstown and Pittsburgh mills.

Annual savings at belt capacity include \$9 million to steel mills in Youngstown on coal and ore shipments; \$10 million to mills in the Pittsburgh area on ore alone; \$2,250,000 to Wheeling district mills; \$10 million on coal to Cleveland and Lorain mills and \$13.5 million to other consumers of industrial and domestic coal. One surprising feature of the project is that ore can be unloaded at Lorain, conveyed to a junction point at Parma, just south of Cleveland, and then moved over the spur line to Cleveland mills at savings tentatively estimated at 40 to 50 cents a ton. Ore vessels now require several hours to move up the "kinky Cuyahoga" to these mills.

Sees Traffic Doubled—It is estimated by Mr. Stewart that Ohio river traffic will about double, thus requiring the expansion of loading and unloading facilities at plants and mines plus construction of some 510 barges and 35 towboats.

The project apparently has the blessing of coal and steel interests and the solid engineering backing of well-known companies, including the



IRON ORE RATE COMPARISONS

(Based on 15 Million Tons Annually)

From Lorain, O., per ton to Youngstown and Ohio river mills

	To Youngstown, O.	To Midland, Pa.	To Monessen, Pa.	To Weirton, W. Va.	To Wheeling, W. Va.
Railroad Rate†	\$1.27	\$1.48	\$1.78	\$1.48	\$1.70
Conveyor Line Rate	0.80*	0.80*	0.80*	0.80*	0.80*
Barge Haul from					
East Liverpool, O.	0.15	0.45	0.25	0.35	
Saving Per Ton.....	\$0.47	\$0.53	\$0.53	\$0.43	\$0.55

† Does not include delivery charge at destination.

* Based on movement of 32 million tons annually, this rate would be reduced to 87 cents per ton, thus effecting an additional saving of 13 cents per ton.

COAL RATE COMPARISONS

(Based on 15 million tons annually)

Ex-river, per ton, from Ohio river terminals	To Cleveland- Akron-Lorain	To Youngstown
*Railroad Rates	\$2.29	\$1.21
Conveyor Line Rate	1.23	0.71
Saving Per Ton....	\$1.06	\$0.50

(Based on 20 million tons annually)

	To Cleveland- Akron-Lorain	To Youngstown
*Railroad Rates	\$2.29	\$1.21
Conveyor Line Rate	0.79	0.40
Saving Per Ton ...	\$1.50	\$0.81

* Rates include 6 per cent increase granted January, 1949.

Goodyear Tire & Rubber Co., the Link-Belt Co. and the General Electric Co. Engineering phases have been well worked out, including the solution of such knotty problems as segregation of various grades and sizes of materials and their routing.

The elevated structure will have minimum clearance of 22 feet and the metal gallery atop the steel support will be fully enclosed. A total of 172 belts or flights will be required for the 103-mile main line. Belt width from East Liverpool to Salem will be 72 inches and from Salem to Lorain 60 inches. Northbound coal over the 72-inch line will move at the rate of 3400 tons per hour. Because of its greater weight, southbound ore will move over the 60-inch belt at 5400 tons per hour. The one-way Cleveland and Youngstown spurs will have belts 42 inches wide. Lengths will be 9 and 19 miles, respectively.

Privately Financed—Material and equipment requirements will include 243,000 feet of 72-inch, 887,000 feet of 60-inch, and 281,000 feet of 42-inch belt; 400,000 idlers to support the belt; 217 terminal power units; 151,000 tons of structural steel and a considerable tonnage of corrugated sheets. Both galvanized steel and aluminum are being considered.

The project will be financed privately and no stock issue will be offered to the public. Construction will take about three years.

Bethlehem Capacity Up in Decade

BETHLEHEM Steel Co. has increased its steelmaking capacity by nearly 3 million tons in the past decade. The capacity rose from 11,247,000 tons in 1939 to 14,200,000 tons as of today.

Freight Car Buying Lags

Railroads warned government aid in obtaining steel may end if orders are withheld

RAILROADS were warned last week government assistance in obtaining steel would be withdrawn unless the carriers placed more orders for cars.

The warning came from Col. J. Monroe Johnson, director of the Office of Defense Transportation, in a letter to William F. Faricy, president, Association of American Railroads.

Orders for cars have been falling off since October. Colonel Johnson reports only 563 freight cars were ordered during January and this in the face of requirements of 2 million new cars by the Class 1 roads.

In each application of the railroads for increased freight rates during the last several years one of the important justifications has been to enable the roads to provide new and additional equipment, Colonel Johnson pointed out. The roads have been granted rate increases of around \$3 billion.

Orders Canceled—In his letter, which also was sent to the National Security Resources Board, Colonel Johnson said there have been several cancellations of cars on order.

The ODT chief said he has been advised the Office of Industry Cooperation will likely agree at the next meeting of its steel committee to an increased amount of steel for new railroad cars and for repairs to old rolling stock. ODT, he said, is with difficulty able to allocate on the 10,000-car monthly level to May but not beyond without more orders.

If at the meeting the allocation of steel is increased to care for 12,000 cars monthly, the ODT will be unable to allocate with the present number of cars on order, and Colonel Johnson said he will refuse the additional steel.

Deliveries Down—Domestic freight car deliveries in January totaled 8913, according to the American Railway Car Institute. This compared with production of 9967 in December.

Of the January deliveries, 6130 were from the carbuilders and 2783 were

built in railroad shops. Production of the leading types of cars was: Box, 1705; hopper, 3318; gondola, 2283; refrigerator, 880; and tank cars, 584.

Orders placed in January were: Car builders, 1393; railroad shops, 175; total, 1568. The December orders totaled 8368.

Of the January orders 1000 were standard model cars to be built for stock by one of the car builders; thus the net orders placed by the railroads and private car lines totaled only 568, states the institute.

The total backlog of orders as of Feb. 1, the institute reported, was: Car builders, 59,984; railroad shops, 36,230; total 96,214. This compares with 119,711 a year earlier, and a high of 134,676 on May 1, 1948.

Freight Car Awards

	*1949	*1948	*1947	*1946	1945
Jan. ..	1,568	8,613	9,222	1,481	7,200
Feb. ..	10,698	13,724	2,328	2,328	1,750
Mar. ..	13,227	12,048	4,512	2,500	
Apr. ..	17,215	9,186	3,564	1,120	
May ..	2,228	7,389	2,900	1,526	
June ..	5,368	12,784	3,335	670	
July ..	11,308	14,840	14,836	3,500	
Aug. ..	3,638	2,352	9,527	7,240	
Sept. ..	738	9,917	11,102	12,840	
Oct. ..	10,931	17,737	3,407	1,320	
Nov. ..	4,852	8,079	7,190	1,650	
Dec. ..	8,368	4,030	3,011	4,116	
Total ..	97,184	121,308	87,193	45,432	

* American Railway Car Institute.

† Preliminary.

Armies Lists New Contracts

DEPARTMENT of the Army has issued a listing of all contracts in amounts of \$100,000 and over awarded to private business concerns since Jan. 12, 1949. Contracts with firms in the metalworking industries are:

Contractor	Item	Quantity	Total Obligated
Henney Motor Co., Freeport, Ill.	Ambulance	78	\$271,822
Van Norman Co., Springfield, Mass.	Milling Mach.	50	264,521
Chrysler Corp., Detroit	Axle	600	184,290
White Motor Co., Cleveland	Auto Parts	...	127,753
Chevrolet Motor Division, GMC, Detroit	Station Wagon	150	292,508
Detroit Arsenal, Centerline, Mich.	Remfg. & Modification of Tanks	...	422,230
Bowen & McLaughlin, Phoenix, Ariz.	Remfg. & Modification of Tanks	...	5,900,000
Bowen & McLaughlin, Phoenix, Ariz.	Remfg. & Modification of Tanks	...	600,000
Detroit Arsenal, Centerline, Mich.	Remfg. & Modification of Tanks	...	422,230
Aeronca Aircraft Corp., Middletown, O.	Rocket Launchers	7,621	508,841
Lofstrand Co., Rockville, Md.	Fire Extinguishers	7,500	147,918
Joseph J. Brede-mann, Chicago.	Tool Equipment	1,800	171,000

Truman "Point Four Program" to help peoples all over the world to achieve a better plane of living holds important implications for business. Aims similar to those of ECA

MANY business observers in Washington are impressed with the possibilities of President Truman's goal of helping peoples all over the world to an improved plane of life. Like the ECA, they know, its achievement will cost a lot of good American taxpayers' dollars to attain. Like ECA, on the other hand, it will bring a lot of business and employment here which we would not otherwise enjoy. So the smart thing to do, from a business point of view, they believe, is to take this dream seriously and exploit to the full the opportunities it will create.

Government officials who are in charge of organizing and executing the project—it is called the Truman "Point Four Program," from the fact that the President brought it out in that position in his inaugural address—see in it a chance to add greatly to the prestige of the United States as the headquarters and fountainhead of everything that goes to make for "a high plane of living." They propose to capitalize on our status as the world's leading industrial nation, and as the foremost proponent of private enterprise and individual liberty, by bringing our good things to other peoples.

Answer to Communism—Entirely aside from idealistic considerations, they look upon the program as essential to promote our security and that of other free nations; it is the answer to the Communist conquest of China. Only underprivileged, discontented people, they feel, go in for Communism. So the best way to fight Communism from here on, they believe, is to have more well-fed, secure, happy people. The interested government officials do not regard this program as an experiment or wild gesture. They know of the remarkable results that have come about in Europe from fighting Communism with the Marshall Plan—and the Truman Point Four Program in essence means an expansion of the Marshall Plan to global proportions.

The Point Four Program will take some time to set up, at least several months, and it will take perhaps several years to get it really rolling. Beyond the grand blueprint the whole thing is hazy as to detail. The program is being worked out by an

interdepartmental full-time committee headed by able Willard L. Thorp, assistant secretary of state for economic affairs. Some 24 government agencies are taking part in the work, with eight of them actually represented on the working committee. These are State, Commerce, Agriculture, Interior, Treasury and Labor Departments, and the ECA and the Federal Security Agency. The latter is important in the picture because its Office of Education will be asked to bear a heavy share of the load in putting the plan into operation.

Advisory Committees Planned—Somewhere in the planning stage, Mr. Thorp will appoint advisory committees from industry and business to serve in consulting capacities, and perhaps to go abroad and make surveys. Their help will be asked in shaping up deals between this country and others, so that exchanges of goods will be aimed at practical economic results. But it will be some time before that stage is reached. The only fundamental determinations, at the present time, are that whatever we do under the program will be through the United Nations and its affiliated organizations.

How much will the Truman Point



WILLARD L. THORP

Four Program cost the government? Government people say that compared with the billions being spent under the Marshall Plan, the new program will cost "tens of millions." They point out that whereas the war almost completely wrecked the European economy, other countries in the world are in much better shape. Government men think that the Point Four Program can be implemented to a large extent through investments of private American capital; they look forward to setting up arrangements which will make such investments very attractive.

Suggests Tax Incentives—One official, questioned by STEEL, does not think the current difficulty of raising private capital for new industry at home will be encountered in promoting foreign investment under the Truman Point Four Program. He thought that the authorizing legislation which Congress is expected to enact later in this session will contain tax incentives that will bring out a lot of private money, and he thought the State Department will be able to get from the foreign countries the types of guarantees, against expropriation, etc., that will be acceptable to many investors in this country.

State Department officials are elated over the warm reception which has greeted the announcement of the Point Four Program. Expressions of good will have been received from all over the world, and practically every country already has asked for details of the plan. Many that have tried to get in under the Marshall Plan are itching to get going under the new program. It probably will not be long before preliminary conferences will be held between the United States and other countries, particularly groups of countries, to agree on development programs for each country.

Foreign Trade Studied—"To set up these programs we probably will get into the most thoroughgoing study of foreign trade ever made," a State Department man told STEEL. "All countries will have to be treated fairly, so that we will have to get eventually to a stage where we will have to work out a balance of total world imports against total world exports. Obviously we will have to work it out one step at a time.

"The government's part," he went on, "will be limited to arranging broad plans of economic development

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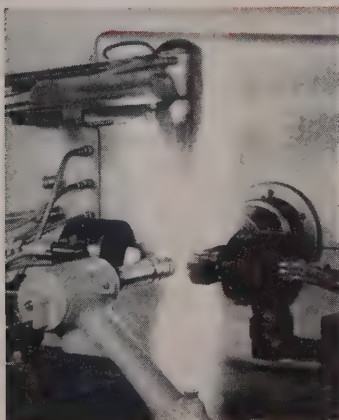
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...with electronic temperature control.

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But more important: the two diameters (pilot and splined portion) were hardened **in one operation** at the rate of 200 shafts per hour. Standard flame heads are arranged to concentrate the desired amounts of heat in the right areas. Hardening each diameter separately wouldn't do, for the second operation would alter the pattern produced by the first. This shaft, length 9-1/16", pilot OD: 51/64", spline OD: 1 1/2", SAE 4140 is one of fifty or more parts Flamatic-hardened by Rockford Clutch Division of Borg Warner Corp. Surfaces are heated to within plus or minus 5°F of preset values by exclusive electronic temperature control. Quick positive setups make small lot production convenient and economical. Adaptability to wide range of parts (gears up to 18" and shafts up to 30" long) makes Flamatic a profit-producing investment for scores of users. Write for informative booklet, Publication M-1658.



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abroad. The actual resulting business will be done by private businessmen. As never before, our salesmen, engineers and technologists will travel about the world to solicit—and get—business. For the United States stands to benefit just as much proportionately from this program as any of the other countries."

Analyze Foreign Development

ANALYSIS of the factors to be considered in the Truman Point Four program has been made by Machinery & Allied Products Institute, Washington.

"A plan of economic co-operation with other countries based upon sound economic principles as President Truman now states will be welcomed by the capital goods industries as a far-reaching program to be thoughtfully examined and aggressively pursued," the institute states.

"Export of capital goods to undeveloped localities must be accompanied simultaneously by the export of the corresponding techniques involved in the use of such goods and the arts of industrial and commercial organization, management and administration required to apply these techniques effectively," the institute believes.

Seek New Manganese Sources

UNCERTAINTY as to the volume of steel production this year because of threatened lack of "raw material" was cited by Sen. John Bricker (Rep., O.) as a factor in causing him to urge favorable action on the bill, since sent to the White House for the President's signature, to extend the life of the voluntary allocations program through Sept. 30. "The raw material involved is manganese," said Senator Bricker, "and we are threatened at the present time with a cutting off of the supply from Russia.

"There are adequate supplies available in other places," he continued. "It is a question whether they can be made available soon enough if the supply from Russia is cut off, whether there may be a slowing down or a drag on the production of steel between the time Russian supplies may be stopped and arrangements can be made, with the aid of the government, to furnish an adequate and timely replacement of the Russian shipments if they should be cut off."

Wallgren To Head NSRB

NAMING of Mon C. Wallgren to the chairmanship of the National Secur-



MON C. WALLGREN

ity Resources Board—to take effect after Senate confirmation — is expected to bring an early end to the stalemate of comparative inactivity which has characterized the board since ex-Chairman Arthur M. Hill resigned early last December. Mr. Wallgren succeeds John R. Steelman, assistant to the President, who has served as acting chairman since Dec. 10; while Mr. Steelman never has issued any statement about his findings in reference to the board, it has been understood that President Truman was not satisfied with the manner in which the board has exercised the functions delegated to it in the National Security Act of 1947.

Ex-representative and ex-senator from Washington, and ex-governor of the state of Washington, Mr. Wallgren has a reputation in Washington for possessing unusual administrative ability. He won President Truman's friendship when he served as a member of the Senate's famous Truman Investigating Committee.

See No Serious Depression

BUSINESS observers in Washington do not expect the recent softer business trend to develop into a serious depression.

Reason: The government has many weapons to fight depression and is using them. Included are the farm and bond price support programs, use of the ECA to maintain export demand, the home mortgage program and other machinery.

Incidentally, the administration appears to be fighting actively to prevent any substantial lowering of food prices. This was revealed when

Chairman Spence of the House Banking & Currency Committee reported the President had phoned him to say that he (the President) wanted authority for granting export license for food to go to Secretary Brannan of Agriculture. It now is in the hands of Secretary of Commerce Sawyer who has been holding down food exports to force lower food prices at home.

Further to siphon off our surplus food stocks, food advisers of the EC in Paris are marking up the request received from the participating European governments with the object of shipping more food than these countries ask. A Republican comments: Even nature, in the form of the blizzards which have killed more than 200,000 food animals on western prairies, has helped the administration's drive to maintain food prices.

Congressmen Get Moreell Letter

COPIES of the letter which Ber Moreell, president, Jones & Laughlin Steel Corp., sent to stockholders and employees Jan. 25 has been sent to all members of Congress, to all cabinet members, and to members of the President's Council of Economic Advisers. In this letter (STEEL of Jan. 31 p. 31), Admiral Moreell recommended that Congress authorize rapid amortization of industrial investments in order to encourage the growth of industry.

Average 1947 Income \$3000

IN VIEW of the President's recent request that Congress levy increased income taxes on families earning \$6000 a year and up, a release just put out by the Bureau of the Census indicates that political angles were not overlooked in arriving at the \$6000 dividing line. Census reports that in 1947 the number of families with incomes of less than \$6000 was 33 million. On the other hand, 4 million families earned \$6000 or more. Average family income in 1947 was \$3000.

Asks All-Rail Line to Alaska

UNDER S. 740, a bill introduced by Senator Magnuson (Dem., Wash.), all-rail transportation from the United States and Canada to Fairbanks, Alaska, would be sought by running from Prince George, British Columbia, a line connecting with the Alaska Railroad. The bill would authorize the President to conduct pertinent negotiations with the Canadian government.

European Industry Seeks Production Aids

Marshall Plan assistance not relied upon solely. Profit-sharing gains momentum in Germany. Norway adopts a labor-training program. French firms pool resources

EUROPEAN metalworking industries are not banking solely on Marshall Plan aid to boost limping production. In Germany a trend toward profit-sharing is gaining momentum as the result of sensational output advances made by a processor of copper concentrates which has adopted the system. In Norway a training-within-industry program has been adopted to support the nation's production drive. Two large French steel firms are pooling their technical resources in order to turn out a greater range of products in greater quantity.

Western Germany

FIRST Western German company which has successfully introduced a profit-sharing and work incentive system is Duisburger Kupferhuette, formerly connected with I. G. Farben. The firm, leading Ruhr processor of copper concentrates, has worked out a detailed plan whereby normal wages are paid, but all profits resulting from higher efficiency are split among shareholders, management and labor. Plant efficiency has been boosted tremendously, and the first large share was paid out last December.

Lack of efficiency, however, is still a major problem with the steel industry. American visitors, such as Wilfred Lykes, Inland Steel Co. president, have commented that many German practices and much equipment in use went out of vogue in America 30 years ago. The Ruhr steelmakers require three to four times as many people for a given job as are needed in the United States.

German industrialists are speculating as to what effect American pressure had on the cancelling by the Joint Export & Import Agency in Frankfurt of a Yugoslavian order for oil drilling and coal mining equipment amounting to \$2.3 million. Haniel & Lueg Co., Dusseldorf, was to have produced the machinery.

Norway

NORWAY'S new labor training program is modelled after the American plans which were so influential in boosting production during the war. Six short demonstration courses have just been concluded in Oslo where 90 members of production

committees from various plants participated. The courses were held under the joint auspices of labor, employer and governmental organizations. Chief purpose of the course was to acquaint foremen with methods of instructing new workers and simplifying normal working operations. It was noted that in several plants where these methods have been applied, this training period had been cut from 14 to 2 days.

Mining operations in Norway's Nordland Province were successful last year. The 1600 miners in the province turned out over 500,000 tons of zinc, copper and pyrites concentrates during the period.

A Norwegian budget proposal for 1949 allots \$6 million to be used during the coming year to speed completion of various hydroelectric projects now under construction. These include the Rosaaga works which will supply power to a new electro-steel plant and other projects now building at Aura, Maar and Glomfjord.

The first turbine unit of Norway's newest electricity source, the 250,000 hp Hol project in Hallingdal, began to turn late last month, to supply 1 million more kilowatt-hours each day into Oslo and eastern cities. With

three additional turbines scheduled to go into operation within the next 18 months, the Hol project will supply 1 billion kwhr of additional electricity yearly. Power from this project will be used primarily to heat the capital city. When completed Hol's yearly power output will have the same heating potential as 350,000 tons of coal, much of which Norway now must import.

France

TWO French steel firms, Acieries de Longwy and U.C.P.M.I., a group operating the Acieries d'Hagonadange in Lorraine, have agreed to pool their technical resources in order to produce as large a range as possible of steel products as economically and as quickly as possible.

This move follows a trend in France to consolidate overlapping operations and to strive for greater economy. Success of the movement can be measured in production for 1948; 6,480,000 metric tons of pig iron were produced, compared with 4,886,000 tons in 1947 and 6,012,000 tons in 1938; 7,248,000 tons of steel ingots and castings were turned out, compared with 5,733,000 tons in 1947 and 6,221,000 tons in 1938; 5,083,000 tons of rolled steel products were made last year, compared with 4,028,000 tons in 1947 and 4,115,000 tons in 1938. These results were achieved despite strikes in October and November.

Automobile production also rose during the year to 190,000 units,



FIAT PLANT: Assembly line at the Fiat-Mirafiori plant, Turin, Italy, is shown above. The Fiat company, which was founded in 1899 at the dawn of the motor age, has 15 production plants in Italy, covering an area of 600 acres. The Fiat-Mirafiori plant alone employs 22,000 workers, builds a complete automobile

compared with 137,377 in 1947. For 1949 it is planned to assemble 220,000 cars.

Belgium, Luxemburg

OUTPUT of ingots and castings in Belgium for 1948 was estimated at 3,915,000 metric tons, compared with 2,285,000 tons in 1947. At the close of the year Belgian furnaces were producing at the rate of 4.3 million tons. Marshall Plan program for 1949 calls for an output of 5 million tons. In Luxemburg the output of steel ingots and castings for last year was estimated at 2,703,000 tons, against 1,720,000 tons in 1947.

Italy

ITALIAN iron and steel exports in the third quarter of 1948 totaled 33,000 metric tons, consisting mainly of tubes, pipes and fittings, which went to Argentina, the Netherlands, Switzerland and Sweden. The engineering industry as a whole has returned to about 75 per cent of pre-war production. Exports of Fiat automobiles are on the increase, and production at the close of 1948 was at the rate of 200 units per day.

Chilean Steel Plant Loan

EXPORT-IMPORT Bank has made a \$20 million loan to Fomento Corporation de Chile to complete construction of an \$83 million steel plant at Concepcion, Chile.

The loan is in addition to \$28 million advanced in 1945 for the planning and early stages of construction.

Terms call for repayment within 20 years with 4 per cent annual interest.

Sidney Sherwood, secretary of the Export-Import Bank, states the steel plant will have a capacity sufficient to supply the total Chilean market except for certain specialized items.

Koppers Co., Pittsburgh, has contracted with the Chilean company to help plan the construction and to supervise operation of the plant.

U. S. Buys Palm Oil for Stock

PURCHASE of \$3,970,000 worth of palm oil for the U. S. strategic materials stockpile, mainly with money from counterpart funds of the Netherlands and Indonesia, is announced by the Economic Cooperation Administration.

Production of palm oil, used in large quantities in the production of tin andterne plate, has been greatly limited because of war damage in principal producing areas which the Japanese occupied.

Promise Quick Conversion

Plumbing fixture manufacturers discuss mobilization problems with NSRB

METAL fabrication facilities of the steel plumbing fixture industry can be quickly converted 100 per cent to war production, spokesmen of the Steel Plumbing Fixture Division, Porcelain Enamel Institute, said at a meeting with representatives of the National Security Resources Board. The meeting was held to determine

the part the industry will play event of another emergency.

It was unanimously agreed that the confusion characterizing industrial adjustments to wartime conditions during World War II could be substantially reduced in case of another war if industry were allowed greater participation in developing the regulations controlling its operations.

Curtail Production — The industry also agreed that in event of emergency, production of bathtub sinks, and other conventional plumbing ware products should be immediately curtailed to whatever volume might be required for hospital, the Army and Navy, replacement for destroyed areas, and essential civilian uses—overall total production to occupy a relatively small part of the industry's full capacity.

With respect to production limitation orders, members of the fixture division urged there be only one order, and that it not be tied-in with those of other government departments or divisions so that its application would become difficult or impossible. They also recommended that the government be fully responsible for furnishing all materials involved, independent of priorities or the manufacturer's individual ability.

Co-operation Urged — It was also emphasized that in order to prevent the breaking up of efficient production teams, which occurred during the last emergency, there should be close co-operation of effort between all branches of the plumbing industry.

An industry "task force" will be appointed, and this group will submit to NSRB a complete report on the industry's status, potentialities, problems and recommendations.

Weldment Group Plans Expansion

AMERICAN Weldment Manufacturers Association, Chicago, plans to enlarge its membership from the present 16 companies, most of whom were instrumental in forming the group.

Any firm in the United States and Canada is eligible to join provided that it does some outside welding in addition to its own production. The present member companies are confined to the Middle Eastern area of the nation, extending from Coatesville, Pa., to St. Louis.

President of the organization is William C. Simpson, Lukenweld Division of Lukens Steel Co., Coatesville, Pa.; treasurer is A. S. Fredrickson, Lakeside Bridge & Steel Co., Milwaukee; and secretary is Hugh Hodges, Graver Tank & Mfg. Co. Inc., East Chicago, Ind.

Calendar of Meetings

Feb. 14-15, Edison Electric Institute: Convention at St. Louis. Institute headquarters are at 420 Lexington Ave., New York.

Feb. 17, Purchasing Agents Association of Alabama: Second annual seller-buyer program, Thomas Jefferson Hotel, Birmingham.

Feb. 21-22, Purdue University and Material Handling Institute: Materials handling conference on Purdue campus at Lafayette, Ind.

Feb. 21-23, Conference of American Small Business Organizations: Tenth national session, Wardman Park Hotel, Washington. Group's headquarters are at 407 S. Dearborn St., Chicago.

Feb. 28-Mar. 4, American Society for Testing Materials: Spring meeting and committee week, Edgewater Beach Hotel, Chicago. Society headquarters are at 1916 Race St., Philadelphia.

Mar. 3-5, American Society of Training Directors: Fifth annual conference, Hotel Carter, Cleveland. Society headquarters are at 705 Fidelity Bldg., Cleveland.

Mar. 10-12, American Society of Tool Engineers: Seventeenth annual meeting, Hotel William Penn, Pittsburgh. Society headquarters are at 1666 Penobscot Bldg., Detroit.

Mar. 11-12, Ohio Regional Foundry Conference: Second conference, to be held on Ohio State University campus.

Mar. 14-17, Chicago Technical Societies Coun-

cil: Seventh Chicago production show. Show manager is Edward C. Bowman, 8 S. Michigan Ave., Chicago.

Mar. 22-23, Export Managers Club of New York Inc.: Meeting, Hotel Statler, New York. Club headquarters are at 2 Lafayette St., New York.

Mar. 30-Apr. 1, American Iron & Steel Institute: Meeting of chairmen and presidents of company members, The Greenbrier, White Sulphur Springs, W. Va.

Mar. 30-Apr. 1, Institute of Metals: Annual general meeting at Institution of Mechanical Engineers, London.

Apr. 5-6, Metal Powder Association: Fifth annual meeting and exhibit, Drake Hotel, Chicago. Association headquarters are at 420 Lexington Ave., New York.

Apr. 6, Detroit Chapter of American Foundrymen's Society: Congress of foundry experience, Rackham Memorial Bldg., Detroit. Jess Toth, Harry W. Dietert Co., is committee chairman for event.

Apr. 9-15, General Motors Corp.: Automobile and product show, Convention Hall, Detroit.

Apr. 11-12, American Institute of Electrical Engineers: Conference on industrial application of electron tubes, Hotel Statler, Buffalo. Institute headquarters are at 33 W. 39th St., New York.

Apr. 11-12, American Machine Tool Distributors Association: Meeting, Hotel Ogdenhorpe, Savannah, Ga.

Lustron Steps Up Output

Builder of steel houses plans to enlarge production schedule from 30 to 75 structures daily in April

FULL-SCALE production is getting underway at the plant of Lustron Corp., Columbus, O., a new enterprise that builds porcelain-enameled steel houses on an assembly line.

Up to now the company has been occupied principally with organizing, financing, designing and tooling-up. With those out of the way, the company will be turning out 30 houses a day next Monday. In April, output is to be 75 a day, and by mid-July production is scheduled for the plant's theoretical peak of 100 a day.

Lustron employment now totals 2500. When operating at full capacity on three shifts, the company expects to employ 7000 people in its 1,100,000-sq ft plant where equipment is valued at \$13 million. The plant and its seven miles of conveyor lines are geared to produce one complete house every 9 minutes.

Using ten tons of steel and two tons of other materials in each house, Lustron can produce 4500 houses with steel already allocated to it.

The initial model of Lustron house is in one size and style. It is a conservative ranch-type, five-room basementless structure, in four exterior colors, plus a variety of interior colors. The company plans to change models each year. Sale price

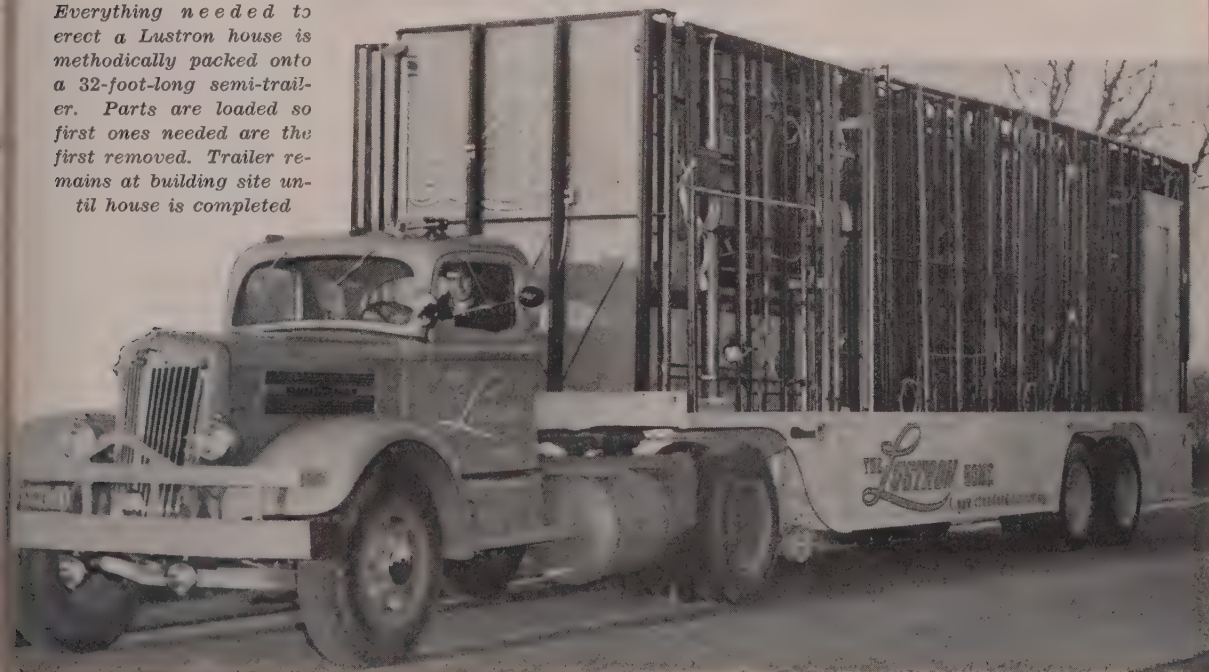


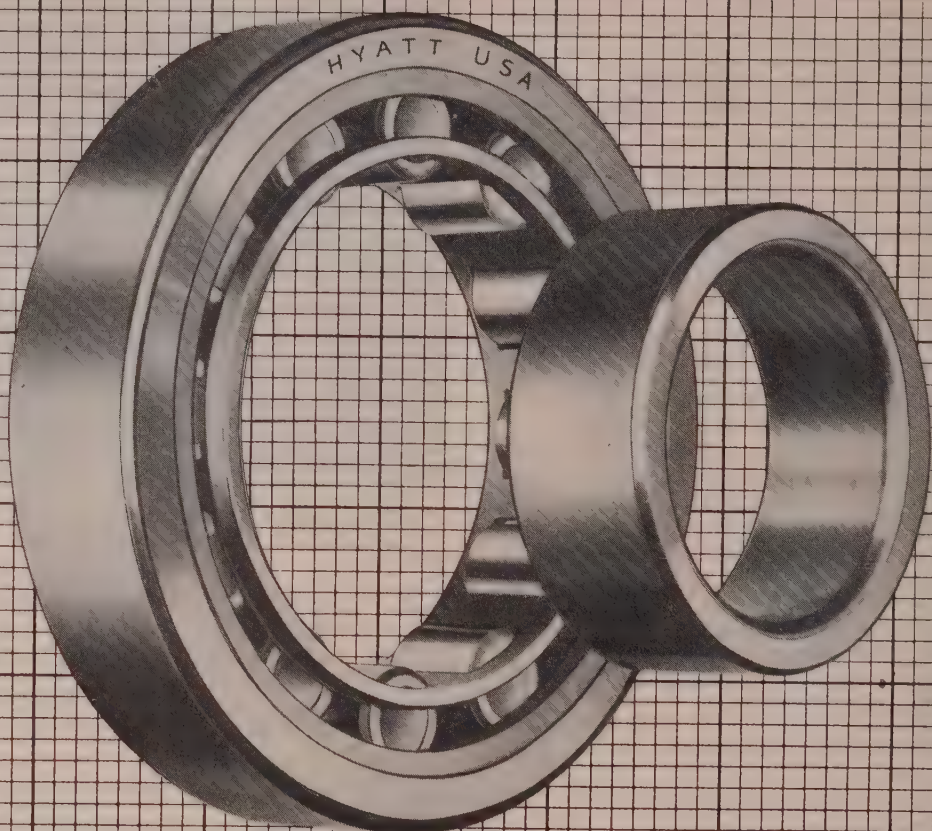
Steel already allocated to Lustron Corp. assures production of 4500 houses

varies from city to city, depending on wage rates and transportation costs. Erected on a purchaser's lot, the price, including excavation, pouring of foundation, erection of house, and running of utilities from the house outlets to foundation edge, ranges from \$8300 in Columbus, O., to \$9300 in New York.

Endeavoring to utilize mass production and handling techniques to the utmost, Lustron will have its houses delivered on specially designed semi-trailers fitted with numbered compartments and drawers. To provide the transportation fleet, Fruehauf Trailer Co., Detroit, was given a \$4 million order for 700 trailers. This order, largest ever received by Fruehauf from a private concern, is to be completed in early March.

Everything needed to erect a Lustron house is methodically packed onto a 32-foot-long semi-trailer. Parts are loaded so first ones needed are the first removed. Trailer remains at building site until house is completed





It pays steel mills to team up with Hyatts

FOR EXAMPLE—90% of the ingot mold and charging box cars used in open hearth plants are equipped with Hyatt Roller Bearings. Why? Because wear is reduced—fewer broken axles—longer trains are handled quicker—less draw bar pull required.

In tables, cranes, motors and other mill equipment Hyatts have given

excellent performances. Hyatts are built to take the tough loads.

For the past thirty years steel mills have shown a marked preference for Hyatt Roller Bearings because they have proved to their own satisfaction that it has paid them to team up with Hyatts. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT ROLLER BEARINGS

Buyer resistance toward higher-priced automobiles increasing. Next few months will tell whether weakening demand is due to seasonal factors or buyers' market

DETROIT

ALL soundings of the automobile market point to the fact that buyers are shying away from the larger and more expensive models, with the possible exception of Cadillac. This is an understandable trend as the market tightens and the next few months will tell whether the situation is just a seasonal matter, as the optimists would have you believe, or whether automobiles are really entering a rugged buyers' market. At this juncture, all signs point to the latter.

If it is to a buyers' market, then the Chevrolet-Ford-Plymouth field will reap the benefit, since they are the lowest priced jobs available, and cursory checks of dealers handling these three seem to bear out the fact that orders are fairly solid. While it is often necessary to do a little combing of backlogs, still there is a sufficient number of names to keep deliveries steady. Many auto dealers have become convinced their so-called order backlogs now have become nothing more than prospect lists, and this is increasingly the case the higher up you go in the price scale.

Big Three Benefits—As might be expected, when buyers become choosy the proportion of sales garnered by the big three—General Motors, Chrysler and Ford—becomes larger. Before the war, they were accounting for about 90 per cent of all sales, and in the years since the war this figure has dropped to something like 75 per cent, as buyers grabbed up almost anything that was available. Now the trend is being reversed and the squeeze is definitely on the independents. Vigorous merchandising efforts can be expected from Hudson, Nash, Packard, Kaiser-Frazer, Studebaker and Willys-Overland as they fight to maintain their sales positions. Three years of lush sales have provided them with ample ammunition to fire away at sales prospects and they will certainly make the most of the opportunity, even though many observers diagnose it as a losing battle.

Approximately 90 per cent of all passenger cars now registered are the Big Three makes, although pro-

duction figures for last year show General Motors accounting for 37 per cent of the total, Ford 18.95 per cent and Chrysler 18 per cent. Among the independents the highest percentage was that of Kaiser-Frazer with 3.28. In registrations, Chevrolet heads the parade in passenger cars with 7,170,670, Ford second with 6,318,273 and Plymouth third with 3,661,449. Chevrolet also leads in truck registrations.

Output Continues High—Certainly

Automobile Production

Passenger Cars and Trucks— U. S. and Canada

	1948	1947
January	422,236	366,207
February	399,471	393,636
March	519,154	443,588
April	462,323	445,138
May	359,996	404,190
June	454,401	421,466
July	489,736	400,944
August	473,146	364,958
September	437,181	444,500
October	516,843	461,536
November	495,918	417,492
December	500,000*	492,819
12 mos.	5,535,405*	5,056,474

* Preliminary.

Estimate for week ended:

		(Same week)
	1949	1948
Jan. 22	113,820	110,774
Jan. 29	115,512	101,044
Feb. 5	104,450	82,717
Feb. 12	110,000	83,996

Ward's Automotive Reports

along the production front there is not the slightest indication of the independent manufacturers relaxing one whit from their high production pace. If their sales pace is slackening, they are dismissing it as a seasonal matter and are continuing to pile cars onto their dealers. Packard is even talking a 30 per cent boost in output this year over last, and plans to reinforce the hope with a hopped-up promotional effort in connection with the company's golden

anniversary, shortly to make the front pages. There will be some model changes to commemorate the event, although they are expected to be minor in character.

As Kaiser-Frazer discovered, there is a limit to the number of cars which can be unloaded onto dealers without sales to justify them, and it would not be too surprising to find other manufacturers in their boat before long. Dealers, of course, must finance these inventories and there is a limit to the amount of paper finance companies will underwrite. K-F made the logical move in attacking credit restrictions imposed by the Federal Reserve Board and seems to have made some success in attracting support. The National Automobile Dealers Association has gone on record as favoring relaxing time payments to at least a two-year basis, with good possibilities seen of early action by the FRB in this direction.

Used Cars Down—Manufacturers are watching carefully the action of the used car market, particularly along Livernois Ave. in Detroit, long regarded the barometer of the old jalopy trade. Right now things are very bad there, with operators disinclined to buy anything new or old. Prices have receded drastically in the past few months and there is little enthusiasm for any upward resumption, even come spring. In a way this is a healthy situation, for prices of new-used cars at several hundred dollars over factory list made little sense. Even now, prices by the standards of 1941 are too high, but whether a little more wringing of the water in them would joggle sales to an appreciable degree is questionable.

Sales Technique Dulled

H. C. DOSS, Nash sales chief, recently told a group of California dealers that the "sales technique of new car dealers has been dulled by 3½ years of order-taking, during which period dealers could sell new cars without even making a telephone call." He also attacked the restrictions of the Federal Reserve Board and cited results of a survey, which indicated 15.4 million prospects for new and used cars before the close of 1950, of which 50 per cent plan to pay cash for their purchases, the rest contemplating time payments.

In company with most other auto-



INTERNATIONAL AUTO SHOW: Scores of foreign-made cars pick up the reflection of hundreds of lights at the opening of the first international automobile show held in Lexington avenue armory, New York, Feb. 5 to 10. More than three dozen foreign manufacturers exhibited models. NEA photo

motive sales executives, Mr. Doss can see little but smooth sailing ahead. He points out that ten years ago 44,220,000 persons were employed at a national income of \$67.4 billion, contrasted with 60 million employed at a national income of \$220 billion. And in the last ten years 11 million new family units have been created, while the population has increased from 129,824,939 in 1938 to 146,571,000 last year. All this means business for the car manufacturers, on top of the fact that 17 million automobiles now are over ten years old.

This factor of car age is commonly accepted as an indicator of a vast market for new and recent-vintage automobiles, on the basis that the antiquated vehicles will simply have to be scrapped. If this factor is pursued a little further, it is evident that somebody is going to be holding the bag, for even if "X" million cars are due for the scrap heap, the persons who own them have an equity therein and may not be inclined to see their transportation equipment consigned to junk, no matter how old it is.

Changeover Without Loss

WITH model changeovers accomplished in record time becoming an accepted reality in the motor industry, thanks to careful planning and integration, the achievement of Plymouth in switching to its 1949 models

"without the loss of any production time" adds new laurels. This Chrysler division operates two assembly lines in its Detroit plant, and when the time came for model change, one line was shutdown and the idled employees transferred to the other line on a two-shift basis. When the first line was completed and production started, the second line was tapered off gradually and more workmen moved to the new line. Finally, when the old line was stopped, the new line was pushed up to two-shift operations while the old line was being converted, and ultimately both lines will be operating as before, with a minimum of layoffs occasioned by the change.

Obviously, there is a little more to it than that. Feeder lines and parts manufacture also had to be revised extensively, while 1948 model work was still in force. However, by and large, the job of sandwiching was done effectively and points the way to the time when the work of a model change will be accomplished with a minimum of disruption, compared with the days when a six-week to two-month closing of plants was the rule.

GM First To Regain Reich Plant

GENERAL Motors is the first American corporation with large prewar properties in Germany to regain complete control of its holdings.

At the beginning of the year GM re-possessed Adam Opelwerke, largest German producer, with a plant at Russelsheim near Frankfurt which is already turning out 2300 units monthly. By the end of the year, 5000 vehicles are expected to be produced monthly, about half the prewar output. The Opel line includes a light truck, a baby passenger car called the Olympia and a heavier auto, the Kapitän.

GM German properties also include a foundry at Leipzig in the Russian zone which has been completely written off as a war casualty.

Ford Overhauls Foreign Setup

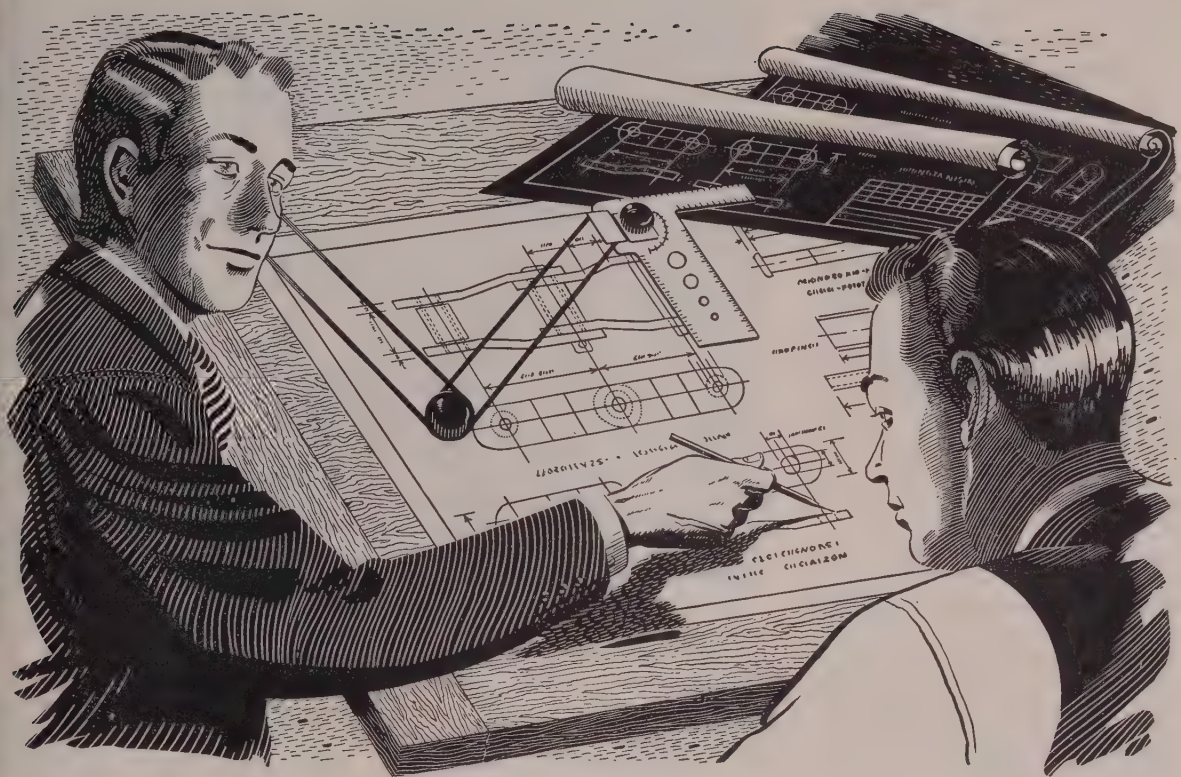
FORD has in process a thorough overhauling of international operations, as outlined here last week. One of the first steps has been the hiring of Walter D. Appel as vice president-engineering for the Ford International Co. Mr. Appel has had a long career in foreign activities, having served with the Overseas Division of General Motors from 1925 to 1946, being one of the first lieutenants of James D. Mooney in this field. When Mooney went to Willys-Overland three years ago, Mr. Appel followed him and was appointed assistant to the vice president in charge of engineering, later becoming chief engineer and finally director of procurement in charge of all purchasing. He will assume his new duties at Ford International on March 7, being succeeded at Willys-Overland by John S. Conant, for the past six months general purchasing agent.

The appointment of Mr. Appel marks another in the long list of General Motors executives who have thrown in their lot with Ford. Head of the International Division is Graeme K. Howard, himself a veteran with the GM overseas operations prior to his retirement a few years ago. The reinforcement of the Ford International organization with these top-flight personnel can be taken to indicate a determined effort to bolster the name of Ford around the world.

Ford's Coast Purchases Mount

WEST COAST purchases of parts and accessories by Ford Motor Co. are nearing the annual mark of \$50 million, and the company now hopes to raise the rate to \$90 million.

This was announced by Stanley W. Ostrander, Lincoln-Mercury operations manager, while inspecting the company's Los Angeles assembly facilities. He said that 43 western firms now manufacture 370 parts for Lincoln, Mercury and Ford cars.



What's Interesting About UNION CHAIN'S Engineering?

Union Chains for Every Application

Drive and Conveying Chains and Sprockets

Bridge Chain

Combination Malleable Iron
and Steel Chain

HB (hardened bearing) type
chain

BP (bar and pin) type chain

★

Finished Steel Roller Chains and Sprockets

All manufacturer's standard,
size $\frac{3}{8}$ in. to $2\frac{1}{2}$ in. pitch

Single and Multiple Strands

Extended Pitch Series in sizes
 $1\frac{1}{4}$ in. to 4 in. pitch

★

Silent Chain and Sprockets

All sizes $\frac{3}{8}$ in. to $1\frac{1}{2}$ in. pitch

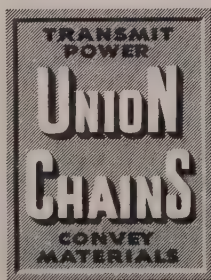
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Flexible Couplings

Roller chain type

Silent chain type

The Engineering Division of The Union Chain and Manufacturing Company devotes all its time and talent to a single objective: the most efficient and economical fabrication and application of sprocket chains and attachments for transmitting power and handling materials. We believe this technical specialization delivers a plus benefit to all our customers, both present and future, not the least of which is the ability of UNION CHAIN'S engineers to tackle successfully a challenging variety of unusual and difficult application problems.



The Union Chain and Manufacturing Company

Sandusky, Ohio, U.S.A.

Electro-Motive Moves

Its production of switching locomotives from LaGrange, Ill., to Cleveland

ALL switching locomotive production of General Motors Corp.'s Electro-Motive Division has been moved from LaGrange, Ill., to Cleveland. The present output of one 600 or 1000 hp unit per day will be increased to two by the middle of the year, according to Andrew G. Finigan, plant manager.

The facility, purchased from the government last year, was used during the war by GM's Cleveland Diesel Engine Division. This division continues to use 174,000 sq ft of the main building area. Switching locomotive operations utilize 265,000 sq ft. The plant grounds include 44.5 acres.

Major components of the locomotive, such as underframes, trucks, hoods and cabs, are completely built up on separate assembly lines. These major components flow together on a final assembly line and are moved to a separate building where the finished unit is tested and painted. Test apparatus, developed by Electro-Motive, assays pulling power, slippage and braking ability.

Sharon Moves Tel-O-Post Unit

SHARON Steel Corp. is moving the plant of its Tel-O-Post Corp. subsidiary from Akron to Farrell, Pa., where production of steel supports for floors will be resumed Feb. 15. Subsidiary also plans to make permanent posts for homes.

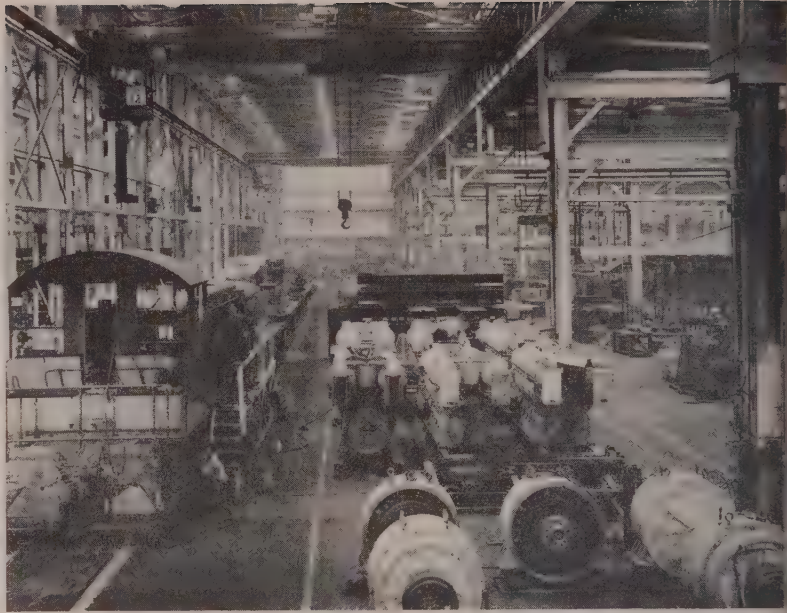
Sharon is putting in a third electric weld tube mill to make sizes up to 4½ inches which will supply Tel-O-Post. It is also moving some steel coating units from the Sharon works to Farrell.

Rockwood Stacks Producing

RESUMPTION of pig iron production at the Rockwood, Tenn., furnaces of Tennessee Products & Chemical Corp., Nashville, Tenn., on Jan. 28 is an important milestone in the long history of that property.

The first furnace in the entire South to use coke in producing pig iron was put in blast in the late 1860s in Rockwood. In subsequent years, the operators played an important part in the development of the southern iron and steel industry and during the last war more than 15 per cent of the United States output of ferromanganese was produced at Rockwood.

The two blast furnaces, using coke



Production in this assembly bay at Electro-Motive's new Cleveland plant has just begun on diesel switchers, 1365 of which are already in service on 107 North American railroads

from the Chattanooga plant of Tennessee Products and iron ore from Brazil and Georgia, now will help relieve the urgent need for quality iron at southern foundries.

Carl McFarlin, president of Tennessee Products, said the company has completed a \$250,000 improvement and re-equipment program to enable the changeover from ferromanganese to pig iron production and that the company anticipates production of 9000 to 10,000 tons of pig iron per month.

McNeil Buys Cleveland Crane

MC NEIL Machine & Engineering Co., Akron, maker of rubber-working machinery, has purchased Cleveland Crane & Engineering Co., Wickliffe, O., producer of overhead materials handling equipment, press brakes and heavy metal cutting machines.

Herbert T. Florence remains as president of Cleveland Crane, and the general management, firm name and policies continue unchanged. Eventual merging of the two companies is contemplated.

C. F. Safreed is McNeil's president.

Caterpillar Expansion Nears End

CATERPILLAR Tractor Co., Peoria, Ill., spent more than \$18 million last year on buildings, new machinery and land.

The expansion and modernization program which has now been under way for almost three years is moving satisfactorily toward completion. In

addition to new construction, the program calls for rearrangement of most of the older factory area.

The new diesel engine factory was completed during the year, and equipment is now being added to produce new engine models which will be offered in 1949. A new steel fabricating plant was also finished, and some assembly work was started in December. This factory should be in full operation by the middle of this year.

Sales for the year totaled \$218,037,541, compared with \$189,119,621 in 1947. Profits were \$13,772,581 and \$9,956,912, respectively.

WAA To Sell Two Detroit Units

WAR Assets Administration is offering for sale two Detroit plants now leased to Timken-Detroit Axle Co.

A general manufacturing plant located on about 9.5 acres of land between West Jefferson avenue and the joint right-of-way of the Per Marquette, Wabash and Detroit Terminal railways. Floor area of about 293,000 sq ft is contained in eight buildings. These structures include an assembly unit, a manufacturing building, a pickling facility, a power house, clock house, shop and two gate buildings. The other offering is a forging plant in Melvindale, Mich., consisting of 11 factory buildings with 143,786 sq ft of area.

Bids on the manufacturing unit must be in the Chicago regional office of WAA by Mar. 10, on the forging plant by Mar. 17.

Briefs . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Crucible Steel Co. of America, New York, reduced its claims for damages to outbound shipments by some 23 per cent in 1948 as compared with 1947. Volume of shipments in both years was approximately the same. Results were accomplished largely through work of a committee, representing all Crucible plants, which studied and improved methods of marking, packaging and loading shipments.

Gray Iron Founders' Society, Cleveland, is launching a monthly statistical service and has invited the 2500 units in the industry to participate. Society hopes to obtain figures on production, number of employees, payrolls, hours worked, demand and lost-time injuries.

Avondale Stove & Foundry Co., Birmingham, has been purchased by J. F. Day Sr. and J. F. Day Jr., operators of J. F. Day Screen & Weatherstrip Co. Avondale will continue production of stoves, parts and castings.

Michigan Oven Co. has been formed at 4544 Grand River Ave., Detroit, to design, fabricate and distribute industrial ovens. R. J. Ruff is president.

Steel City Testing Machines Inc., Detroit, manufacturer of machines for the physical testing of metals, has appointed J. W. Dice & Co., Grand View-on-Hudson, N. Y., as a sales representative in the Middle Atlantic area and Steel City Tool & Machinery Co. Inc., Pittsburgh, as representative for western Pennsylvania, West Virginia and adjacent Ohio counties.

Gits Bros. Mfg. Co., Chicago, producer of lubricating devices and shaft seals, has established a Michigan branch sales office in Ludington. Frank A. Kovarik is in charge.

Foxboro Co., Foxboro, Mass., manufacturer of industrial instruments for measurement and control, has opened a branch office at 123 W. College Ave., Appleton, Wis. Milton A. Schreiner is in charge.

Chicago Association of Commerce & Industry reports construction of new plants and other industrial developments in the six-county Chicago area amounted to \$6,432,000 in January.

For the same month a year ago industrial developments totaled \$12,126,000.

Clark Equipment Co., Buchanan, Mich., has appointed Bond Industrial Equipment Co., New York, as a distributor for its fork lift trucks and industrial towing tractors.

Alabama Dry Dock & Shipbuilding Co. has purchased shipbuilding facilities on Pinto Island, Mobile, Ala., from War Assets Administration for \$652,000. The company was the wartime operator of the facilities, unused since the war, where Liberty ships and tankers were produced.

Cans Inc., Chicago, manufacturer of plain and decorated metal containers and houseware items, has celebrated its tenth anniversary.

MORE REFRIGERATORS

ABILITY to obtain larger amounts of materials including steel and hardware items has enabled Westinghouse Electric Corp. to step up refrigerator production schedules at its appliance plant at Mansfield, O.

About 1600 workers began a six-day work schedule last week and 100 employees have been added to the payroll to meet the new production rate which calls for a 20 per cent increase in refrigerator output.

American Radiator & Standard Sanitary Corp., Pittsburgh, has bought the former Consolidated-Vultee Aircraft plant at New Orleans for \$2,100,000 from War Assets Administration. The company expects to start production of china plumbing fixtures by early fall.

Nelson Stud Welding Division, Lorain, O., Morton Gregory Corp., has appointed Victor Equipment Co., San Francisco, as distributor of stud welding equipment and products on the Pacific Coast.

Budd Co., Philadelphia, delivered 26 all-stainless steel railway passenger cars from its Red Lion plant in January, a new high. Included was the 1000th car Budd has built since it delivered its first lightweight unit

to the Chicago, Burlington & Quincy Railroad in 1934.

Bethlehem Pacific Coast Steel Corp. has increased steelmaking capacity of its Seattle, South San Francisco and Los Angeles plants more than 70 per cent in the past ten years. These plants had combined capacity of 380,000 tons in 1938. A new brochure describing the company's expanded and modernized facilities reports capacity now is 650,000 tons.

Rust Engineering Co., Pittsburgh, was engaged during the past year in work on more than 300 contracts, including facilities for producing glass, paper, asphalt shingles, rayon, pharmaceuticals and margarine.

Production Devices Inc., Whitehall, N. Y., manufacturer of pneumatic and hydraulic vises and power units, has appointed Ralph W. Atkinson Co., Los Angeles, as sales representative in California.

E. I. du Pont de Nemours & Co., Wilmington, Del., reports its 76,000 employees established a new low rate in lost-time injuries during 1948 at 0.72 per million man-hours worked. In 1947, the previous low of 0.91 was established.

Dore Mfg. Co. Inc., Grayling, Mich., is being dissolved, and its plant and equipment will be sold. Principal product of the company was a wire straightening and cut-off machine.

Hydraulic Press Mfg. Co., Mt. Gilead, O., has established a new central district sales office in Mt. Gilead which replaces the office formerly located in Cleveland. Office will be managed by H. J. Miller. A. S. Linzell is associated with him as sales engineer.

General Electric Co. has completed a \$250,000 low-temperature laboratory at Schenectady, N. Y., which will be one unit of the GE research laboratory nearing completion at Knolls, near Schenectady.

Southern States Iron Roofing Co., Savannah, Ga., manufacturer of steel and aluminum roofing and related products and distributor of many building items, plans to open a branch warehouse in New Orleans in the early spring. R. R. Summerville will be branch manager.

Cutler-Hammer Inc., Milwaukee, has moved its Detroit sales office and warehouse to expanded quarters at 15427 Woodrow Wilson Ave. E. F. Weiss is district manager.

The Business Trend

DESPITE filling pipelines and the entry of a number of products into buyers' markets in recent months, industrial activity continues at fairly high levels with STEEL's index for the week ended Feb. 5 at 170 per cent (preliminary) of the 1936-1939 average. Although this represents a decline of 2 points from the preceding week, the current level of industrial activity is 12 points higher than in the corresponding week of 1948, which year was considered by many to be the ultimate in peacetime production.

STEEL—Continuing as a pace-setter for industry as a whole and helping materially to maintain the industrial production index at its present levels, the steel ingot operating rate was 100 per cent of capacity in the week ended Feb. 5. Operations for the five reporting dates this year average above 99 per cent of capacity.

POWER—Also an important factor in sustaining industrial activity at high levels is the availability of an increasing amount of electric power. Another new weekly record for electric power distributed was set during the week ended Jan. 29, topping 5.8 billion kwhr. Weekly distribution figures during January averaged about 400 million kwhr more than a year ago and were more than double the prewar weekly average.

AUTOMOBILES—The expected model changeover at the plants of a principal builder was principally responsible for the drop in production by the nation's automobile industry, although part of the decline

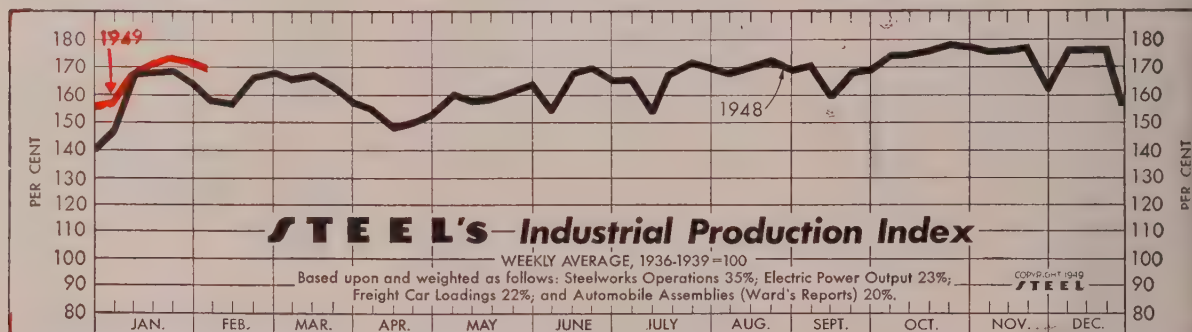
is the result of inclement weather. A total of 104,450 passenger cars and trucks rolled off the assembly lines during the week ended Feb. 5, about 12,000 units below the volume for the preceding week.

PETROLEUM—Bureau of Mines announced that stocks of crude oil were boosted for the fourth consecutive week in the 7-day period ended Jan. 29 to 255,459,000 barrels, about 32 million barrels more than a year ago. With stocks in oversupply, a number of leading refiners have announced price cuts.

RAILROADS—Domestic freight car deliveries during January totaled 8913 compared with December production of 9967, according to American Railway Car Institute. Of the January total, 6130 were from the car builders and 2783 were built in railroad shops. Production on the leading types of cars was: Box car, 1705; hopper, 3318; gondola, 2283; refrigerator, 88; and tank cars, 584.

CONSTRUCTION—Civil engineering contract volume in the continental United States totaled \$565,826,000 for January, an average of \$141,457,000 for each of the four weeks of the month. The total is 16 per cent below the weekly average for December but 60 per cent above January, 1948.

SALES—Manufacturers' sales for 1948 totaled \$23 billion for an increase of 12 per cent over 1947, according to the Commerce Department. The increase in volume of goods sold, however, was small with the major portion of the rise in dollar sales attributable to higher prices.



Index (chart above): Week ended Feb. 5 (preliminary) 170 Previous Week 172 Month Ago 167 Year Ago 160

BAROMETERS of BUSINESS

INDUSTRY

	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)†	100.0	99.5	97.5	90.0
Electric Power Distributed (million kilowatt hours)	5,778	5,810	5,742	5,400
Bituminous Coal Production (daily av.—1000 tons)	1,744	1,903	1,446	1,800
Petroleum Production (daily av.—1000 bbl)	5,351	5,439	5,454	5,300
Construction Volume (ENR—Unit \$1,000,000)	\$209.7	\$212.2	\$124.5	\$120.0
Automobile and Truck Output (Ward's—number units)	104,450	116,471	98,422	82,700

* Dates on request. † 1949 weekly capacity is 1,843,516 net tons. 1948 weekly capacity was 1,802,476 net tons.

TRADE

Freight Carloadings (unit—1000 cars)	690†	679	722	700
Business Failures (Dun & Bradstreet, number)	145	136	128	120
Money in Circulation (in millions of dollars)‡	\$27,556	\$27,561	\$28,151	\$28,100
Department Store Sales (changes from like wk. a yr. ago)‡	-7%	+2%	none	+2%

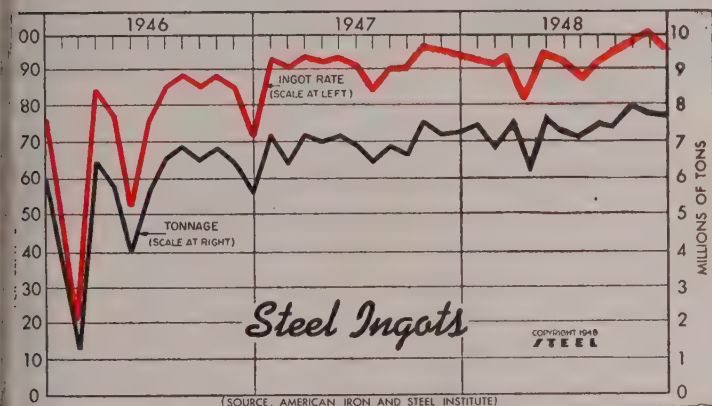
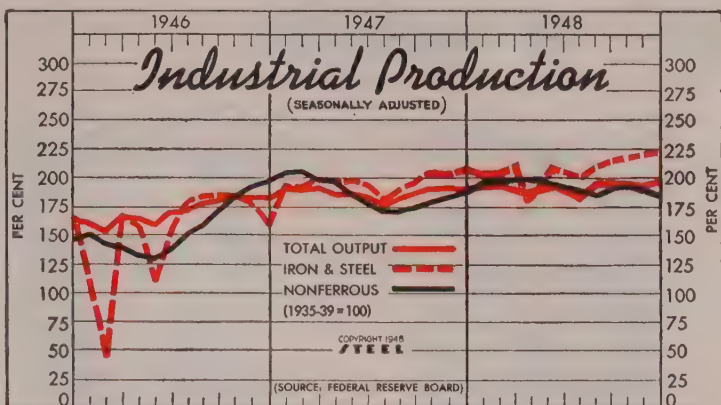
† Preliminary. ‡ Federal Reserve Board.

Federal Reserve Board's Production

Indexes

(1935-39 = 100)

	Total Production						Iron, Steel Nonferrous					
	1948	1947	1948	1947	1948	1947	1948	1947	1948	1947	1948	1947
J.	193	189	203	192	197	203						
F.	194	189	203	191	197	208						
M.	192	190	207	196	200	202						
A.	188	187	177	195	198	197						
M.	191	185	206	197	197	187						
J.	192	184	207	193	193	179						
J.	186	176	200	181	185	171						
A.	191	182	207	188	186	170						
S.	191	186	214	190	191	174						
O.	195	190	221	205	192	179						
N.	195	192	223	203	187	185						
D.	192	192	222	205	185	189						
A.	192	187	208	193	193	187						



Steel Ingots

	Production (Net Tons—000)			Operating Rate (% of Capacity)		
	1948	1947	1946	1948	1947	1946
Jan.	7,473	7,213	3,873	93.6	93.2	49.6
Feb.	6,940	6,422	1,393	93.0	91.9	19.8
Mar.	7,608	7,307	6,509	95.3	94.4	83.3
Apr.	6,218	7,043	5,861	80.4	93.9	77.5
May	7,560	7,329	4,073	94.8	94.7	52.2
June	7,256	6,969	5,626	93.8	92.9	74.4
July	7,089	6,570	6,619	88.7	85.1	84.9
Aug.	7,438	6,982	6,924	93.1	90.2	88.7
Sept.	7,416	6,789	6,556	96.1	90.8	86.9
Oct.	7,987	7,560	6,952	100.0	97.7	89.0
Nov.	7,779	7,233	6,458	100.6	96.5	85.4
Dec.	7,756	7,366	5,760	97.4	95.4	73.9

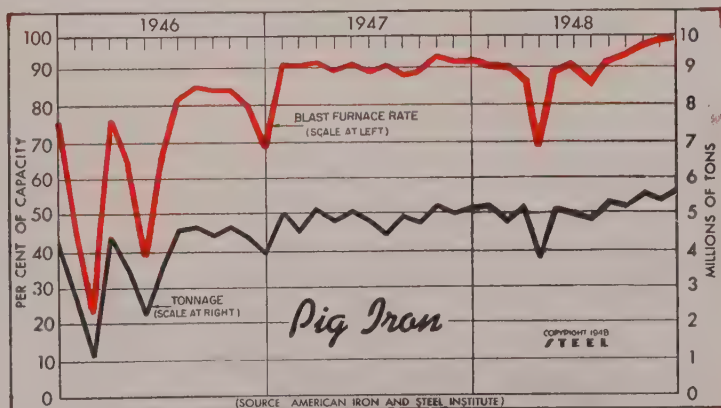
Total 88,509 84,784 66,603 Ave. 93.9 93.0 72.5

Pig Iron*

	Production (Net Tons—000)			Operating Rate (% of Capacity)		
	1948	1947	1946	1948	1947	1946
Jan.	5,194	5,071	2,644	90.9	90.8	47.4
Feb.	4,838	4,650	1,148	90.6	90.3	22.2
Mar.	5,020	5,123	4,424	87.8	91.8	77.3
Apr.	3,840	4,830	3,614	69.4	89.3	65.2
May	5,077	5,081	2,274	88.8	91.0	39.8
June	4,990	4,810	3,682	90.2	89.0	66.5
July	4,900	4,585	4,705	85.9	90.3	82.4
Aug.	5,255	4,916	4,898	92.0	88.1	85.6
Sept.	5,208	4,801	4,687	94.3	89.0	84.8
Oct.	5,520	5,228	4,814	96.6	93.6	84.1
Nov.	5,399	5,015	4,435	97.6	92.8	80.0
Dec.	5,595	5,177	3,992	98.1	92.9	69.9

Total 60,849 59,210 45,318 Ave. 90.2 90.1 67.4

* Includes ferromanganese and spiegeleisen.



FINANCE

Bank Clearings (Dun & Bradstreet—millions)	\$13,922	\$13,907	\$15,045	\$14,344
Federal Gross Debt (billions)	\$252.6	\$252.4	\$252.4	\$254.9
Bond Volume, NYSE (millions)	\$17.7	\$17.0	\$16.1	\$20.8
Stocks Sales, NYSE (thousands)	4,686	4,681	5,339	5,126
Loans and Investments (billions)†	\$62.9	\$62.9	\$62.8	\$65.0
United States Gov't. Obligations Held (millions)†	\$33,411	\$33,749	\$32,987	\$37,323

† Member banks, Federal Reserve System.

PRICES

STEEL's Composite Finished Steel Price Average	\$97.77	\$97.77	\$97.68	\$78.59
STEEL's Nonferrous Metal Composite‡	232.6	232.6	232.6	189.5
All Commodities†	158.8	158.8	161.3	164.6
Metals and Metal Products†	178.3	177.9	175.2	154.4

† Bureau of Labor Statistics Index, 1926=100. ‡ 1936-1939=100.

Men of Industry



EDWIN S. LEWIS

Donovan Wire & Iron Co., Toledo, O., announces the appointment of **Edwin S. Lewis** as director of purchases for the parent and subsidiary companies. Since 1942 he has been Toledo district sales manager for Jones & Laughlin Steel Corp.

Courtney Burton has been elected a director of Oglebay, Norton & Co., Cleveland. He is president and also a director of E. W. Oglebay Co. and Richwood Sewell Coal Co., as well as a director of a number of other companies. **Harrie S. Taylor** has been elected a vice president of Oglebay, Norton & Co., which he has served as general counsel since 1936, and since 1940 as general manager of its mining operations.

William J. Mays has been elected a vice president, and **H. Douglas Chisholm** as secretary of Cordley & Hayes, New York.

T. F. Rose, Cincinnati branch manager, Timken Roller Bearing Co.'s Service Sales Division, has become manager of Timken Roller Bearing Service & Sales Ltd., Toronto, Canadian subsidiary of the Timken Roller Bearing Co. He succeeds the late **C. E. Webster**. **H. C. Telford**, assistant manager of the Atlanta branch of Timken, becomes the new Cincinnati manager. **Seward T. Salvage**, assistant district manager of industrial bearing sales in Cleveland, has been made sales promotion manager of the company, with headquarters at the general offices in Canton, O.

George R. Brockway, general sales manager, Rapids-Standard Co. Inc., Grand Rapids, Mich., has been elected vice president in charge of sales, and



DAVID LARKIN

Wendell A. Smith, credit manager, has been elected an assistant secretary-treasurer.

At the annual meeting of the Wire Rope Institute, Washington, **David Larkin** was elected president for a one-year term, succeeding **E. C. Low**, John A. Roebling's Sons Co., who became chairman of the board. Mr. Larkin, executive vice president, Broderick & Bascom Rope Co., St. Louis, has been identified for 21 years with the wire rope industry. Other new officers elected are: Vice president, **H. C. Parker**, Bergen Wire Rope Co.; secretary, **W. A. Huber**, American Chain & Cable Co.; treasurer, **D. W. Vernon**, A. Leschen & Sons Rope Co.

Dr. John F. Thompson has been elected president of International Nickel Co. of Canada Ltd., Copper Cliff, Ont. **Dr. Paul D. Merica** has been elected executive vice president, and **Henry S. Wingate**, vice president. Dr. Thompson, formerly executive vice president, succeeds **Robert C. Stanley** as president. Mr. Stanley, who has been president and chairman of the board of directors since 1937, continues as chairman.

Fletcher W. Rockwell has resigned as chairman and a member of the board of National Lead Co., New York. **Joseph A. Martino**, president, continues as the chief executive officer and as chairman of the executive committee of the board.

C. R. Terry, sales engineer for the past 11 years with Hydraulic Press Mfg. Co., and manager of its Cleveland and Pittsburgh offices for the



R. J. TREMBLAY

past six years, has organized the Terry Machinery Co., Cleveland, as a sales agency for metalworking machinery.

R. J. Tremblay has been named general superintendent of the Los Angeles plant, Bethlehem Pacific Coast Steel Corp., and **Hubert C. Swett** was appointed assistant general superintendent. Mr. Tremblay will have charge of all steelmaking processes and manufacturing units at the plant.

B. John Heiser has been elected president of the Central Ohio Steel Products Co., Galion, O., succeeding the late **Gilbert L. Stiefel**. He has been with the company since 1926, and has served as vice president for the past 11 years and as a director for the past four years. He also is president of the subsidiary company, Galion Allsteel Body Co.

Optimus Equipment Co., Matawan, N. J., announces appointment of **Melville Morris** as executive vice president and member of the board of directors. This appointment follows the merger of Midwestern Mfg. Co. of New York with Optimus Equipment Co., a subsidiary of Hanson Van Winkle-Munning Co. **A. Otto Millen** has been appointed Middle-west district supervisor, and **L. G. Evans Co.**, representative for Illinois, Indiana and Wisconsin.

C. D. Allison, general sales manager, Dearborn Stove Co., Dallas and Chicago, has been named assistant general manager of the company, which he joined two years ago. He formerly was with Westinghouse Electric Supply Co. as advertising

Is **MOISTURE** your magnet problem?

Here's an Ohio lifting magnet that operates underwater 50 percent of the time, retrieving hot crop-ends from a cooling pit. It is a standard Ohio bolted-type magnet which has not been waterproofed in any way!

This unusual application proves the extra margin of moisture protection built into every Ohio Magnet.

For longer magnet life and greater dependability, why not send your next order to Ohio—25 years a leader in magnetic materials handling.

Remember this picture next time you buy!



SELECT YOUR MAGNET
from two Ohio types. The
PROTECTO-WELD mag-
net, shown here, is made in 39, 46, 55 and
65-inch diameters. Bolted construction types
include these and other smaller sizes.



THE OHIO ELECTRIC MFG. CO. • 5900 MAURICE AVENUE • CLEVELAND 4, OHIO

and sales promotion manager for 18 years.

—○—
Merrill J. Sahli has been appointed superintendent of Columbia Steel Co.'s sheet mill at the Torrance, Calif., plant, succeeding **C. B. Gray**.

—○—
Albert B. Willi has been elected vice president, Continental Motors Corp., Muskegon, Mich., and will serve as assistant general manager of the company's Getty St. plant, responsible for production of the \$18.8 million tank engine order recently placed with Continental by the Ordnance Department. He will continue as executive vice president of Continental Aviation & Engineering Corp. **Guy Harinton**, vice president, Continental Motors, will be works manager of the tank engine plant.

—○—
John G. Wood, since 1945 chief engineer, Chevrolet Motor Division, Detroit, General Motors Corp., has been appointed executive assistant to the general manager for engineering. **Edward H. Kelley**, associated with Chevrolet since 1928, and assistant chief engineer since 1945, succeeds Mr. Wood as chief engineer.

—○—
James L. Myers has been elected president of Associated Industries of Cleveland. He is president of Cleveland Graphite Bronze Co., and has been a member of the association's board the past year. Mr. Myers succeeds **W. R. Burwell**, president, Brush Development Co. **A. E. Gibson**, president, Wellman Engineering Co., has been re-elected vice president of Associated Industries, and **Claude E. Murray**, executive vice president, Willard Storage Battery Co., was elected treasurer, succeeding **George S. Case**, Lamson & Sessions Co.

—○—
E. M. Slonaker, Chicago district sales

manager, Willard Storage Battery Co., Cleveland, has been named to direct the company's Related Products Division. He is succeeded at Chicago by **Charles H. Meyer**, Kansas City district sales manager, who, in turn, is succeeded by **J. R. Carlisle**, special sales representative in the Chicago district.

—○—
John Nooter Boiler Works Co., St. Louis, announces re-election of **Harry Nooter** as chairman, and **Elmer J. Nooter** as company president. **R. J. Ryan**, vice president and general manager, has taken the new title of executive vice president. **S. C. Tracy**, former secretary-treasurer, has been elected vice president and treasurer. **H. A. Frith**, another newly elected vice president, will continue as plant superintendent. **Herbert H. Koch**, former assistant to the secretary and treasurer, has been elected secretary.

—○—
R. W. Murphey has been named advertising manager for Taylor Forge & Pipe Works, Chicago.

—○—
George Lenz Jr. has been appointed assistant manager of sales, Nottingham Steel Co., Cleveland. He joined the company in 1946, having previously been plant metallurgist, Union Drawn Division, Republic Steel Corp.

—○—
Robert W. Moffett has retired as general manager of fabrication of Lukens Steel Co., Coatesville, Pa., after 23 years of association with the company. **Raymond M. Dennis**, assistant to the general manager of fabrication at By-Products Steel Corp., a subsidiary, has been named manager of fabrication of this subsidiary company. **Frank C. Kardevan**, assistant to the general manager of fabrication of another subsidiary, Lukenweld Inc., has been named manager of fabrication for that company.

Both will report to **L. M. Curtiss**, general works manager of Lukens Steel Co.

—○—
Glenn Logan has been appointed special representative, Cleco Division, Reed Roller Bit Co., Houston, and will be located at Atlanta.

—○—
David Conte has been appointed office manager of the Plainfield, N. J., plant of David Smith Steel Co. Inc., S. Plainfield.

—○—
D. R. Lindley has been appointed Indiana sales representative for industrial fasteners, Oliver Iron & Steel Corp., with office in Indianapolis.

—○—
H. S. Dersheimer has joined Macwhyte Co., Kenosha, Wis., as direct factory representative, with headquarters in Tulsa, Okla.

—○—
Paul J. Breden has been named southern district manager, New York Belting & Packing Co., Passaic, N. J., succeeding the late **J. Edwin Conaway**. Mr. Breden will have headquarters at Dallas.

—○—
Edward F. Fisher has been elected president of Gar Wood Industries Inc., Detroit, succeeding **Charles W. Perelle**, resigned. Mr. Fisher has been a director of the company. He was a vice president of General Motors Corp. and general manager of its Fisher Body Division until 1944. He remains a director of General Motors.

—○—
Sterling H. Albert, chief underwriter in Wisconsin for the Federal Housing Administration, has resigned to become assistant to the vice president, Lustron Corp., Columbus, O.

—○—
Fitzsimons Steel Co., Youngstown, announces the resignation of **John Metcalf** as vice president and gen-



JAMES L. MYERS



RAYMOND M. DENNIS



FRANK C. KARDEVAN

eral manager, and the appointment of **William F. Stewart** as general manager.

James W. Reynolds, former vice president and director, Sun Chemical Co., New York, has joined the chemical department of General Electric Co., at Pittsfield, Mass., as sales manager of silicone products. He will be located at Waterford, N. Y.

Malcolm D. Corner has been appointed manager, commercial research, American Bridge Co., subsidiary of United States Steel Corp., Pittsburgh. **George B. Parker** has been appointed assistant sales organization counsel for the corporation; **Harry L. Aufderheid** has been appointed an assistant traffic manager, and **E. J. O'Connell**, general traffic supervisor of the corporation subsidiaries in the Pittsburgh district.

John M. Dolan, former vice president of sales, Le Roi Co., Milwaukee, has been appointed vice president in charge of sales, Hydraulic Press Mfg. Co., Mt. Gilead, O.

James B. Fisher, chief engineer, Waukesha Motor Co., Waukesha, Wis., has retired and is succeeded by



AVERY C. ADAMS

Lloyd L. Bower, who has been assistant since 1940. Mr. Fisher continues as a director.

Avery C. Adams has been elected vice president in charge of sales of the Portsmouth Steel Corp., Portsmouth, O. Widely known in the steel industry, Mr. Adams joined the Trumbull Steel Co., Warren, O., now part of Republic Steel Corp., in 1920. In 1926 he was appointed assistant general manager of sales of Trumbull. Later he served as manager of tin plate

sales for Republic Steel, resigning that position in 1928 to become assistant to the president of General Fireproofing Co., Youngstown, of which company he was named vice president in charge of sales in 1930. In 1936 he joined the Carnegie-Illinois Steel Corp., Pittsburgh, as manager of sales, Sheet Division, and in 1938 resigned that post to become vice president and assistant general manager of sales, Inland Steel Co., Chicago. He was elected vice president in charge of sales and to the executive committee and the board of directors of the United States Steel Corp. of Delaware, Pittsburgh, in 1939, and in 1945 resigned to become associated with Charles A. Koons & Co., New York, as an executive with the parent company and its subsidiaries.

Norman J. Leary has been appointed manager of industrial sales and service, Circo Products Co., Cleveland.

Ralph V. Hunt, formerly vice president and comptroller, Douglas Aircraft Co. Inc., Santa Monica, Calif., has announced his affiliation with Touche, Niven, Bailey & Smart, certified public accounting organization, devoting his time to the firm's Pacific Coast activities.

OBITUARIES . . .

John F. Alexander, 60, special steel industry representative, Signode Steel Strapping Co., Chicago, died Feb. 7. He joined American Steel & Wire Co. as a salesman in 1912, and became assistant to the vice president, United States Steel Corp., in 1932.

George F. Simson, 61, sales executive of Bethlehem Steel Co. at its New York office, died Feb. 7 in Overlook Hospital, Summit, N. J. He had been with Bethlehem for 30 years and before that was with the former Pennsylvania Steel Co.

Earl J. Hoyt, associated with Brizard-Mathews Machinery Co., Eureka, Calif., died Jan. 27. He was formerly an executive of Skagit Steel & Iron Works, Sedro-Woolley, Wash.

Myron J. Zimmer, 56, vice president in charge of product development, Ekco Products Co., Chicago, died Feb. 6. He joined Ekco in 1929, and formerly was with International Business Machines Co. and A & J Kitchen Tool Co.—the latter company being purchased by Ekco in 1929.

John A. Grass, 57, president, York

Corrugating Co., York, Pa., died Jan. 29. He had been affiliated with the company for many years, and had held his position as president for two years.

Edward R. Mills, 73, who retired in 1943 as manager, Washing Machine Parts Sales Division, Ingersoll Steel Division of Borg-Warner Corp., Chicago, died Feb. 6.

Harry J. Saladin, 59, manager of the lubricating department, Standard Oil Co. of Indiana, died in Evanston, Ill., after a long illness. He joined Standard Oil in 1922 as a division engineer in the technical department.

Alfred S. Willard, 69, vice president of the Mills Metal Co., Cleveland, died Feb. 7.

Joseph P. Busher, 62, manufacturer's representative for Ackermann Mfg. Co., Wheeling, W. Va., for the past 17 years, died Jan. 28 after a short illness.

Roy A. Thompson, 60, assistant superintendent of production, Reeves Steel & Mfg. Co., Dover, O., died Jan. 26.

Gustaf L. Kollberg, 70, retired man-

ager, blower and compressor department, Allis-Chalmers Mfg. Co., Milwaukee, and an engineer there for 40 years, died Feb. 2.

Ronald W. Ewert, 47, since 1947 Savannah, Ga., district sales manager of the Cyclone Fence Division, American Steel & Wire Co., died Feb. 2.

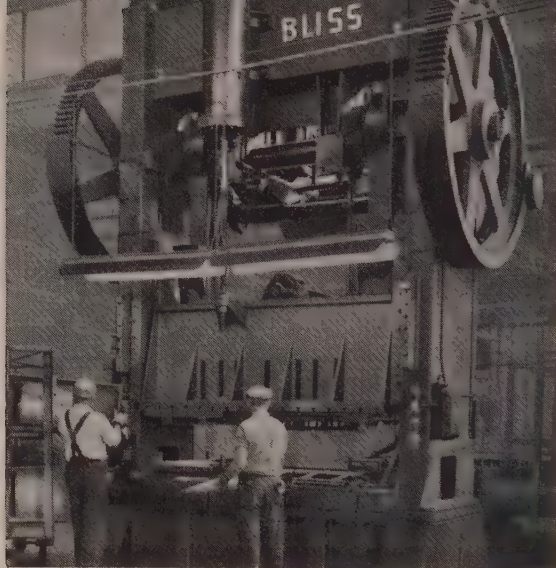
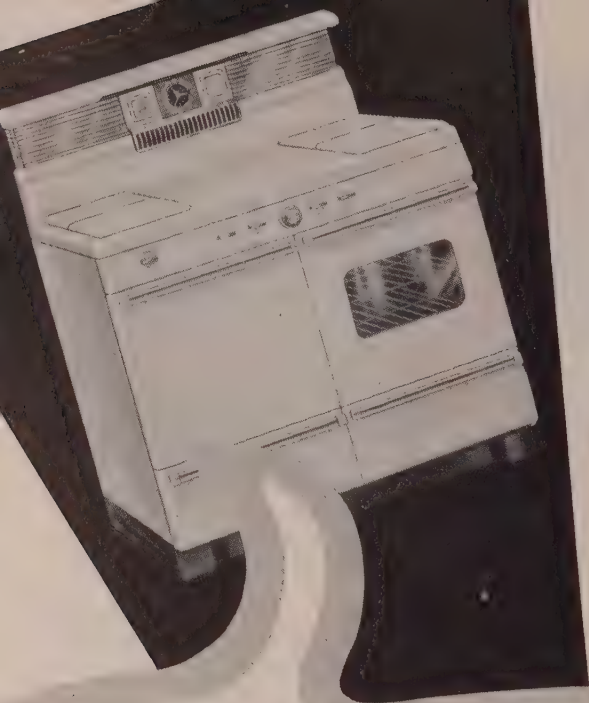
Harold C. McDonald, 61, auditor for Republic Brass Co., Cleveland, died Feb. 8.

John H. Dodge, 69, who retired last year as president of Lowell Wrench Co., Worcester, Mass., died in Stockton, Calif., where he has been living.

Martin M. Murray, 64, for the last 10 years supervisor of Habishaw Cable & Wire Co., Yonkers, N. Y., died Feb. 4.

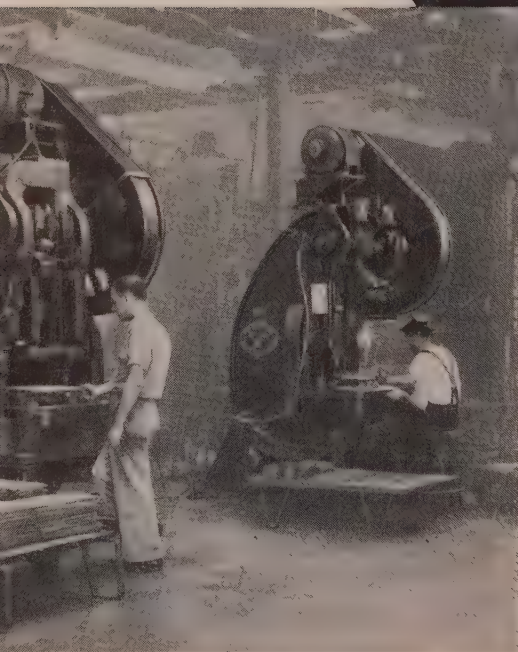
Samuel Jull, 61, board chairman, Pittsburgh-Erie Saw Corp., Pittsburgh, died Feb. 4 after a heart attack. He became president of the company in 1935, and was elected chairman last May.

Harry W. Beedle, 69, former manager of the Boston branch, Electric Storage Battery Co., died Feb. 3.



Three sets of dies in this 400-ton Bliss press simultaneously trim two corners, flange front, trim two ends and pierce and redraw grate opening of main top of oil stove. Triple die set-up performs more than 1000 operations every hour.

NEW FLORENCE STOVE

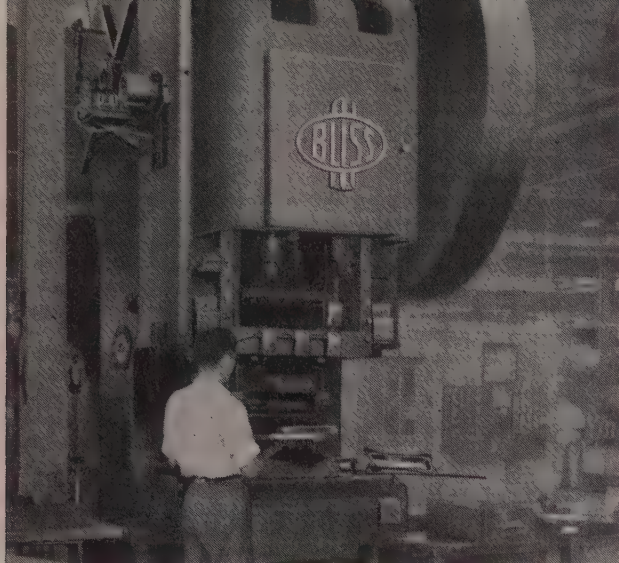


No. 30 Bliss Arch Press piercing and blanking a variety of stove parts. Arch presses provide the rigidity of a straight side press and a proportionately larger bed area...are ideal for blanking operations on large area sheets of light gauge metal.

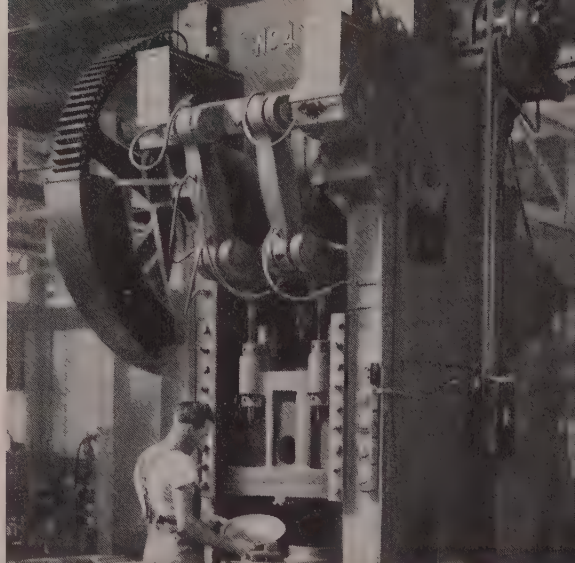
All sixty-one presses at the new Lewisburg, Tennessee, plant of Florence Stove Company are Bliss-Built. Why? Because past-performance analysis of Bliss and several other make presses in the Company's Gardner, Massachusetts, plant was yardstick enough for Florence to know the advantages of an All-Bliss-equipped plant.



BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY IN THE WORLD



Reservoirs for oil stoves are drawn in a Bliss No. 29 open back inclinable press equipped with Bliss die cushion. Material is 20 gauge steel .035. Main top of stove is drawn in a Bliss Double Crank Press—largest in the Florence Lewisburg plant.



One of several new Bliss toggle presses at the Florence plant forming heater tank top. This No. 4 press is equipped with a die cushion in bed which is used alternately for an additional forming operation or a knockout, depending on the particular job.

PLANT GOES 100% BLISS

“Bliss Equipment gives us up to 50% more production”

—FLORENCE OPERATIONS HEAD

Here's how G. B. Colburn, vice president in charge of Florence Stove's Lewisburg operations, sums it up. "Experience at our Gardner plant, which was 60% Bliss-equipped, proved that Bliss presses gave us higher productivity per press with less 'downtime' for maintenance and repair. Our press runs are short, die-changeover is frequent with about 1100 dies in steady use, and the presses are worked hard. Bliss equipment gives us up to 50% more production. Many of our older Bliss presses are still being used for the operations for which they were originally bought—thanks to the assistance of Bliss engineers in selecting the right press for the job."

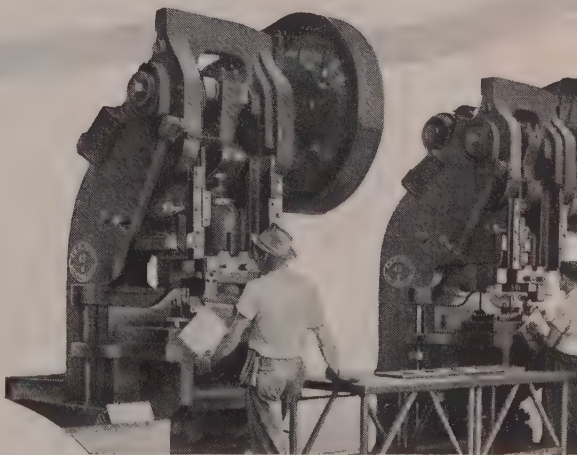
Add Florence Stove to the universal list of press users whose stamping lines are predominantly Bliss...who know that BLISS on a press is more than a name—it's a guarantee. You'll get the same dividends by putting your pressed metal problem up to Bliss.

See our catalog in SWEETS—or send for Bulletin 35B

E. W. BLISS COMPANY, DETROIT 2, MICHIGAN

Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery

WORKS AT: Toledo, Cleveland, Salem, Ohio; Hastings, Mich.; Englewood, N. J.; Derby, England; St. Ouen sur Seine, France.



Bliss Adjustable Bed Presses trim front and rear corners on lift covers—also perform many forming operations on other stove parts. Screw adjustable table gives wide range of shutheight.



Three of several dozen Bliss inclinable presses shown blanking manifold clip and leg plate for oil stove.

FLASH-BUTT WELDED RINGS

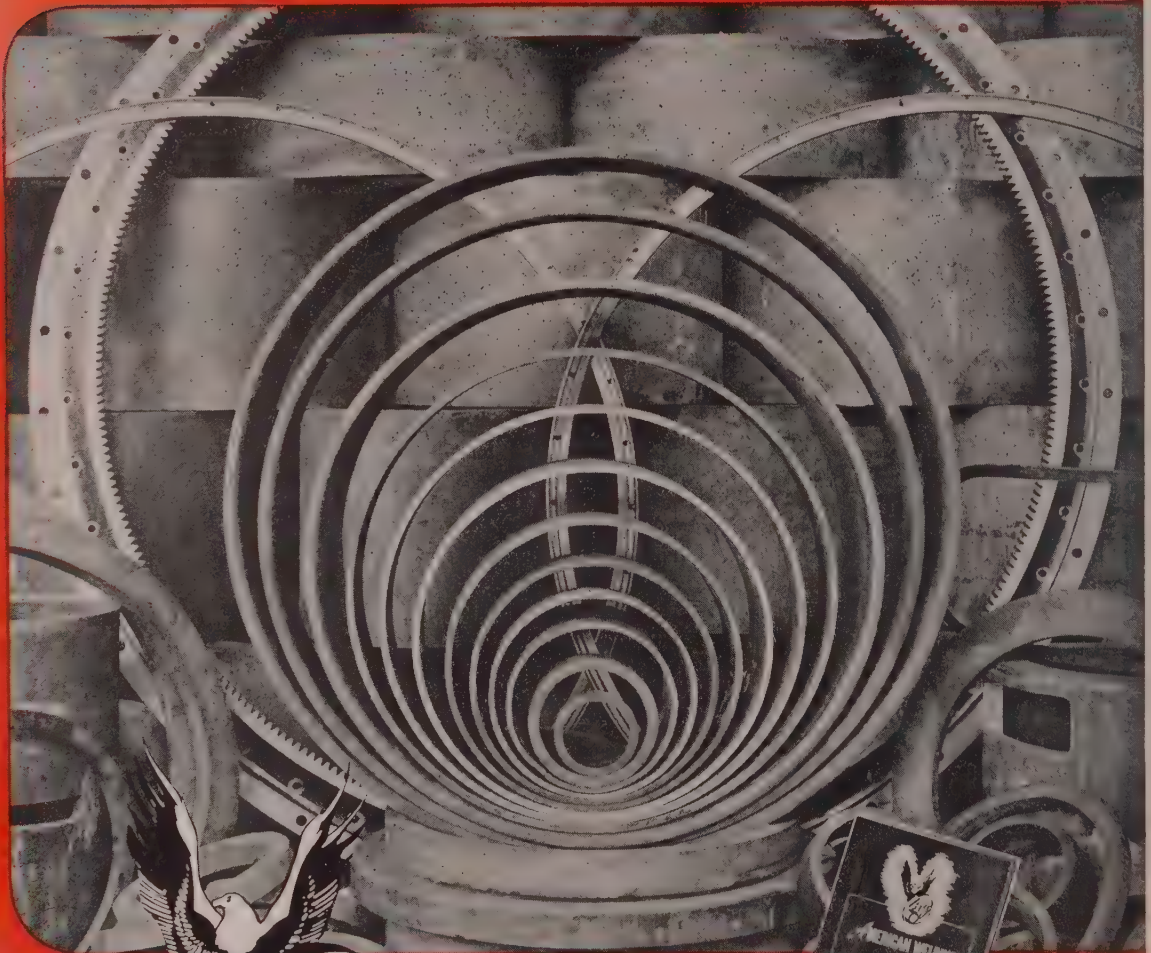
and BANDS *by* AMERICAN WELDING

Flash-butt welded rings and bands . . . both carbon and alloy . . . prove to be superior. Records show that there is a substantial

SAVING IN THE PRICE OF RINGS SAVING IN THE COST OF TOOLING

when rings and bands are produced by the American Welding "Controlled Technique" process of flash-butt welding.

If you use rings, bands, or any other welded product, send your specifications, quantity, and prints for prompt quotation.



4" TO 96" IN DIAMETER



THE

AMERICAN WELDING

AND MANUFACTURING COMPANY

110 DIETZ ROAD • WARREN, OHIO



Send for
16 page
catalog

BUSHING SIMPLIFIES PRODUCTION—In Milwaukee, Allis-Chalmers reports that the incorporation of new high-voltage sidewall bushings in its entire line of 2400-volt distribution transformers is expected to accelerate production. Bushing arrangement is said to eliminate use of deep drawing steel and associated processes used in forming and fabricating pockets to the tank wall. Furthermore, it reduces tank height as much as 3 inches while combining all of the simple mechanical advantages of a tank-wall stud type bushing plus electrical and weather protective advantages of a pocket type bushing.

TIME SAVER FOR STEEL PLANTS—Many man-hours per day can be saved in steel plants by a simpler and faster method of measuring phosphorus in metal, Prof. James L. Kassner, University of Alabama, revealed before the fourth annual analytic symposium of the Pittsburgh section of the American Chemical Society. Recently perfected modified test is reported to make it easier for a technician to obtain good results without previous experience. The test not only speeds up results, but eliminates need for making arbitrary corrections inherent in commonly used methods.

ANOTHER "LARGEST"—Extruded from a special ingot, a pure molybdenum seamless tube produced recently by Fansteel Metallurgical Corp., Chicago, is believed to be the "largest" in the world. Weighing 9750 grams, the tube has a 2-inch outside diameter, 1/4-inch wall thickness. It measures 43 inches in length. The tube, according to the company, also has a density of 10.2 grams per cubic centimeter. Besides being resistant to many forms of acid corrosion, molybdenum has a high melting point—2625° C—and retains most of its desirable physical properties at elevated temperatures.

STRIPS BULK WORK—Nickel and other metal coatings now can be chemically dissolved from steel at speeds of 0.0002 to over 0.001-inch per hour without harming the base metal by an alkaline material developed by Enthone Inc., New Haven, Conn. Process, which consists of immersing parts in a solution of the salts heated to about 160-180° F, is reported to be ideal for removing plated nickel from bulk work such as barrel nickel-plated steel. Solution can be used in a steel tank and requires no electric current. It also is effective for removing copper as well as silver, cadmium and zinc from steel.

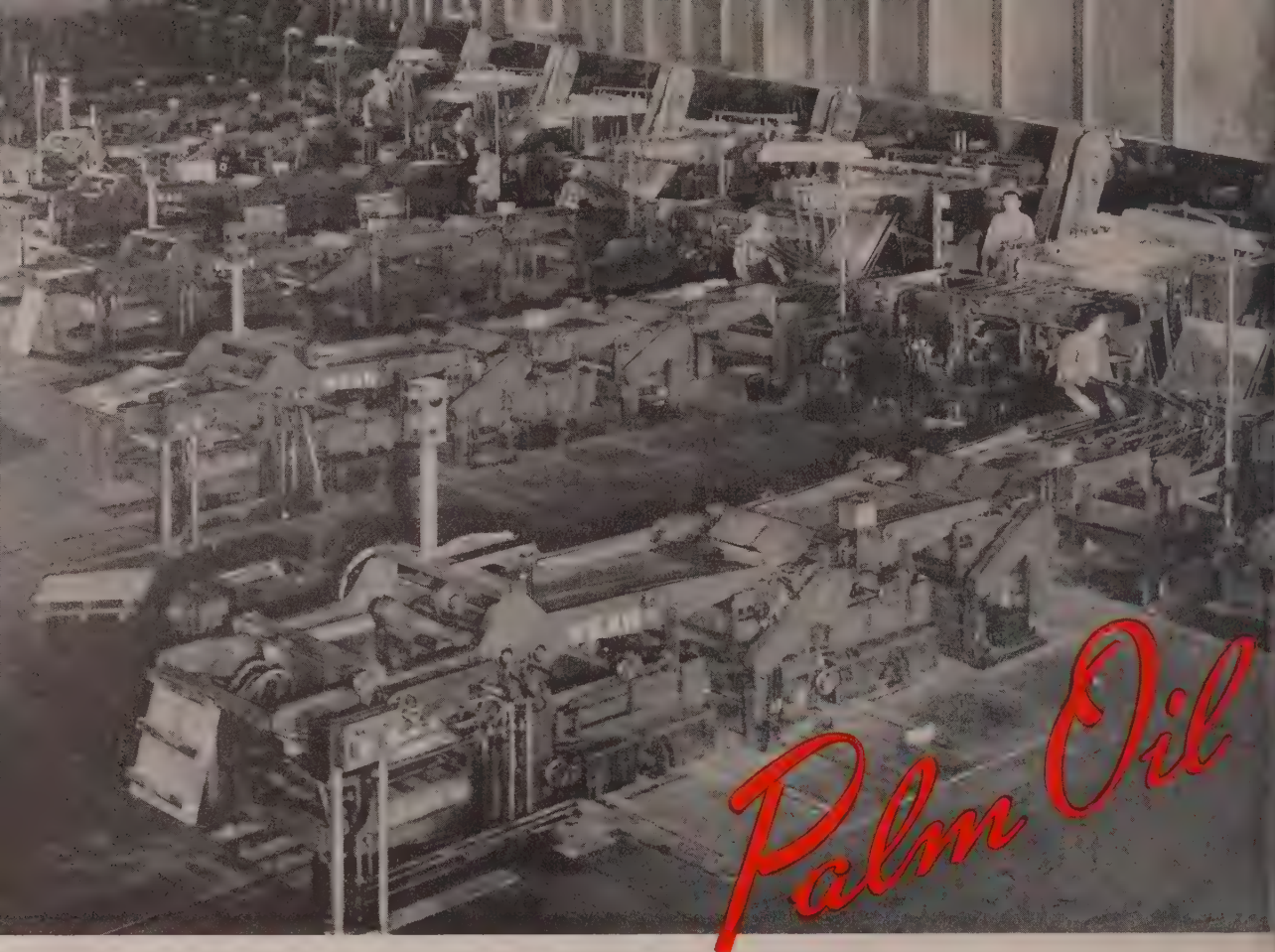
"HIGH-SPEED" ATOMS—Because atoms do a lot of traveling between the grains that make up a piece of metal, radioactivity is being used by General Electric scientists to learn more about the internal structure of metals. According to the company, knowledge of how these atoms behave under various conditions may make it possible to "design" metals for specific jobs. In a recently completed experiment, it was found that silver atoms within a block of silver may move between the grains as fast as one tenth of an inch per week at 500° C. Atoms passing through rather than around grains, however, take about 10,000 years to move an inch. A radioactive isotope of silver, called "silver-110", which was electroplated on the surface of the silver block, was used in the experiment.

BACKING UP OIL—In tinning operations, the replenishing oil, as a concentrate, serves not only as a physical replenishment but also to maintain the desired optimum characteristics of the tinning oil. The tinning oil itself is used as the initial charge or fill. The second or replenishing oil replaces that volume of tinning oil lost in service through "drag-out" and volatilization, and also adds to the first oil those active constituents lost more readily in service than the base vehicle itself. Two new oils are reported to show every indication of being satisfactory replacement materials for palm oil under such circumstances. (p. 84)

AIM AT THINNER FINISH—Ultimate aim of the porcelain enameling industry is to obtain a finish with a thickness equivalent to that of organic finishes—about 0.003-inch. Development of titanium enameling steel is contributing much in the attainment of this goal. Results obtained in using many thousands of tons of this metal are reported to be highly encouraging. (p. 90)

SHORT TIP LIFE—Spot welding aluminum and its alloys is one of the most difficult production jobs involving resistance welding. One serious problem in this connection, it is pointed out, is the relatively short electrode tip life. It is believed that pickup starts from the very first spot and becomes progressively worse. Electrode tip life is a function of tip pickup or deposition of aluminum on the tip rather than deformation of the tip surface—as in the case when joining ferrous materials. (p. 93)

AIR WEIGHT IMPORTANT—Although not often given serious consideration, air weight in connection with an open hearth charge is a definite influence and may have considerable effect on furnace performance. Since 2 tons of air are consumed for every ton of steel produced, air is the heaviest component involved in the charge. All other charge materials are subject to close control since they can either be weighed or measured. On the other hand, air is extremely difficult to control because of many conditions in the furnace system which are subject to continual change. (p. 96)



1—Installation of 14 hot dip tinning units. Courtesy Wean Engineering Co. Inc.

Service characteristics, physical and chemical properties of mineral-base oils for tinning and other applications indicate the approaching success of a research program which has been in progress for nearly 5 years

TO THE informed engineer in the steel industry, palm oil is as much a commonplace as steel itself. Introduced to the industry years ago, palm oil, used for cold rolling, tinning, grinding and other applications, has held a unique but not unchallenged position, particularly in rolling and tinning operations in which the average annual use during the past 10 years has been about 40 million pounds.

Consisting as it does of a variable mixture of glycerides and various fatty acids, palm oil has certain limitations in usefulness due to its composition. The effects of high temperature, as in tinning andterne plate applications, are well known. In rolling, wherein friction reduction versus ability of the rolling solution to permit adequate "bite" on the strip is a problem, there has been considerable discussion based on differences of opinion regarding optimum blends, concentrations and application methods.

However, such utility factors have for a long time been relegated to a position of importance secondary to that of supply. Although an import, palm oil has for years been readily available in enormous quan-

ties at low prices. This fact, plus its proved general usefulness in the industry, has long discouraged and delayed any comprehensive attempt to develop a suitable or even superior commercial replacement.

Fortunately, there was enough palm oil available during the last war, and there is now. However, it is on a basis of economics which challenges the technical ingenuity and commercial judgment of industry engineers and management to find a better way.

On the composite thesis of adequate supply and reasonable cost is predicated the endeavor, participated in by an increasing number of investigators, to find palm oil replacements at least as good and preferably better than palm itself. Not to minimize on the economic aspects, the possible danger of a restricted supply of such a strategic material in another time of national emergency is not to be regarded lightly.

Selecting an Oil for Tinning—Use of oil for hot dip tinning only will be considered here since such oil as is used in electrolytic tinning is applied to the finished tinned strip only as a final coating to facili-

PROGRESS in DEVELOPING

Replacements

By E. L. H. BASTIAN
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tate subsequent lithographing and forming of the can stock. Cottonseed oil has been found quite suitable for this latter purpose, and is commercially used.

To understand what nature of development is necessary in formulating a hot dip tinning oil, and what kinds of materials may be suitable, it is, of course, essential first to know the function of the oil and the operating requirements imposed on it in the tinning process.

Actually, a hot dip tinning oil is required to serve several purposes:

1. To form a protective oil coat on the freshly tinned surface of the plate emerging from the tin bath to facilitate two things:
 - a. To maintain plate surface temperature sufficiently high to aid proper stripping of the tin and secure a uniform tin coating on the plate. Temperature control is very important in the operation. Too high a tin bath temperature may result in a tin-iron amalgam on the plate. This is obviously undesirable.
 - b. To provide for slow cooling of the tinned plate and protect the surface until its temperature is below that at which detrimental tin oxides would form.
2. The tinning oil should to some extent absorb tin oxides that may be formed and excess flux residues carried over with the tin. This action of the tinning oil implies, to some extent,

a fluxing action of the oil itself. The use of fatty oils, such as tallow, in the old "grease process" for tinning relied on this characteristic of fluxing action.

At first glance it might appear that the first two requirements mentioned above (i.e., forming a warm coat and also a cooling coat on the tinned surface) are paradoxical. Actually, these requirements are so stated to take into account the relation of plate temperature to tinning time, considering that the process is continuous. Palm oil is usually maintained at about 475°F as carried on top of the molten tin. The tin is held at a temperature about 100°F above its melting point of approximately 450°F. Tin at the feed end of the tinpot is usually somewhat higher in temperature to heat rapidly the incoming cold sheets. Feed of the plate through the machine may be from 150-500 inches per minute.

Method of handling the tinned plate through the oil blanket and condition of the hot oil have an important bearing on the tinning results obtained. Even with good operation the trailing or "list" edge of the tinned sheet usually carries a heavier tincoat than the rest of the plate.

If due to deterioration of the oil from service its viscosity increases too rapidly, it may not "drain" or "run-back" fast enough on the tinned plate emerging above the oil surface. In such case, excess oil flows in streaks and collects in globules on the plate. The tincoat beneath such oil adherences is usually thinner than the rest of the plate. These are known as "grease marks". They are naturally undesirable since they detract from a uniform tincoat thickness, sometimes to the extent of forming depressions penetrating to the alloy layer, thus forming potential pores.

Another effect of high oil temperature may be staining of the tinned surface. This color is attributed to the thickness of the oxide film on the tincoat, and may be minimized or prevented by proper control of tinning temperatures. Discoloration of tinned surfaces caused by polymerization of the tinning oil is termed "lacquer formation".

The tinning oil should be free from excessive smoking and fogging, and its use should constitute no serious fire hazard in commercial equipment. Consumption due to carry-over and volatility should be reasonable. The ideal oil should, in addition, be readily available in large domestic supply, and inexpensive as compared to palm oil.

Palm Oil Replacement for Tinning—In 1943, Shell Oil Co. began the sponsorship of an investigation at Battelle Memorial Institute proposed to lead toward development of suitable mineral-base replacement products for palm oil in hot dip tinning processes. Concurrently, a program was similarly established toward development of related materials for use in cold reduction of steel strip to tinplate gages.

Both fundamental and practical aspects of the problem were then studied on a laboratory scale. Essentially, the premise on which this work was approached is that an ideal oil can be formulated by combining a certain proportion of active constituent with a stable nonactive vehicle such as mineral oil.

The usefulness of the latter over a relatively wide range of temperatures is well known.

First actual tinning tests on experimental materials were made as "beaker tests", that is, manual hot dip tinning of small steel strips. This method served as a screening test for formulas which were believed to have fundamental promise.

While the relative efficiency of various blends could thus be determined for article hot dip application, such tests were obviously inadequate to qualify the performance of an oil in continuous sheet tinning. The principal point involved here was the "draining" or "run-back" characteristics of the oil on large tinned sheets. This was demonstrated in results obtained in continuous sheet tinning in a full-scale commercial installation.

Several methods of comparing the draining character of various oils using manual dip procedure were attempted without success. These tests indicated that small differences in the molten tincoat thickness had an important effect on test results. The thicker the molten tincoating, the better the draining characteristics were for any given oil. Best method for evaluating the performance of an oil is in actual tinning machine operation, since the thickness of the tincoat can be regulated by mechanical adjustment of the rolls.

A small continuous sheet tinning machine was installed for the purpose of all subsequent test evaluation.

Two Oils Used—By this time, a mineral-base tinning oil satisfactory for article hot dip tinning had been developed and field tested. Actually, there are two oils used in the application. The first is the tinning oil itself used as the initial charge or fill. The second oil is the replenishment or makeup oil, used, as the name implies, as a replenishing material to the tinning oil. This replenishment serves two purposes. First, it replaces that volume of tinning oil lost in service through "drag-out" and volatilization. Second, it replenishes the tinning oil with active constituents lost more readily in service than the base vehicle itself. The replenishing oil, as a concentrate, therefore, serves not only as a physical replenishment but also to maintain the desired optimum characteristics of the tinning oil.

They have demonstrated certain advantages over materials such as palm, tallow and other fixed oils used in hot tinning. Several such advantages reported are as follows:

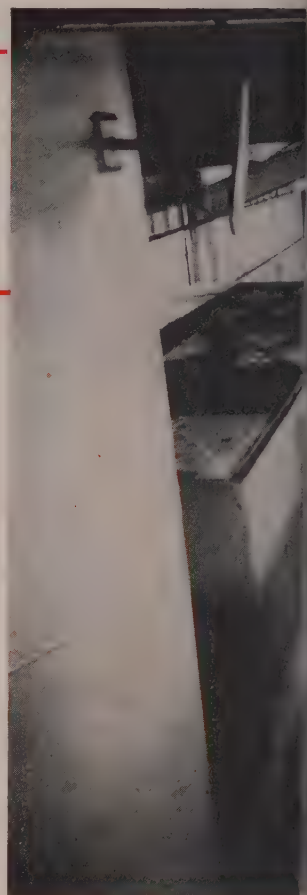
1. Preaging of oil is unnecessary.
2. Good tinning results over longer periods of service at optimum temperatures.
3. Stability at service temperatures.
4. Very little smoke or fumes in service.
5. Reasonable consumption—low volatility.

Continuous sheet tinning machine tests with Peblum oils indicated a need for further work to improve "draining" and cut down on "drag-out" losses. The initial machine tests showed "spongy tops". This condition, a network of heavy ridges of tin near the upper or leading edge of the sheets, is usually associated with slow "draining". Upon reaching the blast of cooling air along the catcher rolls, the oil

adhering to the bottom of the sheet is splashed onto the top of the following sheet as it emerges from the oil bath. This causes the molten tin to solidify prematurely into a spongy appearing pattern. This, of course, is detrimental both to appearance and to desired uniformity of tincoating.

Renewed appraisal of the problem led to study of an additional number of base stocks and finished oil blends.

Fig. 2—Palm oil cookers, weighing and storage facilities



ACKNOWLEDGEMENT

The author gratefully acknowledges the assistance of F. C. Cutting and N. B. Wilson, Shell Oil Co., and of Bruce W. Gonser, R. J. Nekervis and R. M. Evans, Battelle Memorial Institute, Columbus.

Production Test—Through the co-operative assistance of a large tinplate producer, arrangements were made for a full-scale production test of the newly-developed tinning oils in one of their regular stacks. Two oils were again used, a tinning oil "A" formulated to requisite tinning properties, and an oil "B", a concentrate blend to replenish losses from "drag-out" and volatilization. This use of two products, one supplementing the other, has the advantage of allowing optimum formulation in the tinning oil blend and taking care of replenishment requirements exactly as needed. Oil "B" used above for tinning, for example, would not give as good results as oil "A". The latter, on the other hand, would be inadequate as a replenishing oil.

A commercial tinning machine, segregated from the line and supplied from an auxiliary tank equipped for manual pump circulation of oil, was allocated for test. All conditions for operation were maintained the same as when using palm oil in regular produc-

tion. The oil was heated to 465°F and the test started. Two sizes of sheet were subsequently tinned during the 2-week test period. Over 6000 base boxes were tinned, with results as least comparable to those with palm oil in every respect.

No serious difficulties were encountered with use of the test oil. Replenishment with oil "B" was made as required on the basis of additive depletion and observation of "draining" characteristics of the

oil. Draining was found to be good with proper oil replenishment. Appearance of the plate produced was similar to that obtained using palm oil.

It was noted during the test that volatile oil constituents condensed rapidly and closer to the stack than with palm. These condensed drops sprayed back over the Poole feeder onto sheets before introduction into the flux bath, resulting in white spots. The occurrence was eliminated by curtaining the Poole feeder with a steel plate. Temperature control of the test oil was similar to that with palm oil.

Consumption of the test oil averaged 0.21 pounds per base box, based on primes, compared to 0.30-pounds per base box for palm oil. The average oil coating weight with the test oil was 0.90-pounds per base box.

Bran (rye middlings) consumption with the test oil was 0.10-pounds per base box as against 0.25-pounds per base box using palm oil.

Good Yield—Yield of hot dip plate for the test period was similar to that obtained when using palm oil (91 per cent primes, 5 per cent menders, 4 per cent waste). An analysis of the menders showed 36 per cent of them due to the white spots previously mentioned. Since this was an easily remediable defect, the per cent of menders can be readily reduced. Analysis of the wasters indicated no unusual defects and could be attributed to use of the test oil. Most of the wasters, as in the case of normal tinplate, were due to steel defects or prior processing of the sheets.

The test oil did not in any way adversely affect the quality of the tinplate. With respect to tincoat-



Sheet	TABLE I Coating Wt.	Porosity
1. Test plate		
Top	1.00 lb./B.B.	7.8 pores/sq. cm.
Bottom	0.94	8.2
2. Test plate		
Top	1.20	8.0
Bottom	1.00	6.6
3. Palm tin plate		
Top	0.90	8.8
Bottom	0.95	6.0
4. Palm tin plate		
Top	1.00	8.0
Bottom	1.10	9.6

TABLE II
RELATION OF PALM OIL FRACTION TO ACID NUMBER

Fraction Number*	Per Cent Cut	Acid No.
Original Nigerian Palm	100.0	32.0
Cut 1	10.1	197.0
Cut 2	13.5	49.0
Cut 3	17.0	2.0
Cut 4	15.9	1.0
Cut 5	16.5	0.7
Cut 6	13.9	1.2
Cut 7	4.5	1.9
Cut 8	3.5	3.3
Residue (by difference)	5.2	7.4

*Fractions showed—same friction reducing properties as (original) palm oil.¹
¹ Various fractions of original palm oil obtained by molecular distillation.

TABLE III
STAINLESS STEEL SHEET GRINDING DATA

Sheet size 0.037 x 36 x 96 inch			
Belt—80 grit			
Grinding machine—Mattison			
No. of passes—11			
	#1	#2	
	V-6560 Oil	Palm Oil	
Grinding pressure #/sq. in.	11.25	11.25	
Volume oil used—gals.	3.5	3.5	
No. sheets polished	23	23	
Average cut/pass	0.000157	0.000123	
Average surface Temperature °F.	223	230.5	
Average No. surface pits	0.8	1.3	
Belt condition	Good	Worn	
After 29 sheets with V-6560 oil—belt was worn but still serviceable.			
After 25 sheets with oil #2 (palm oil)—belt was worn and required change.			

TABLE IV
TEST WITH GRINDING OIL V-6663

Sheet size 20 gage (0.0375 inch) x 24 x 120 inches					
Belt—100 grit x 30 inches					
Grinding machine—Mattison					
Sheet No.	Load, Amps.	Av. Sheet Temp. °F.	Max. Sheet Temp. °F.	No. Pits Per Sheet	
1	35-45	...	...	4	
2	35-45	240	...	4	
3	35-45	280	330	8	
4	35	270	290	8	
5	55-60	290	...	4	

A second oil of similar type from another supply was substituted with comparable data resulting. Load on machine had to be held to 35-40 Amps. to maintain sheet temperature at 240-250° F.

Neither oil is considered comparable to oil #1 V-6560, but suitable for lighter polishing. Average cut per pass 0.000115-inch.

TABLE V
STAINLESS STEEL GRINDING OILS—TYPICAL PROPERTIES

	Oil #1 V-6560	Oil #3 V-6663	Commercial Grinding Oil
Gravity °API	27.7	28.5	26.8
Flash °F.	430	425	...
S.S.U. Vis. @ 100° F.	215	229	188
Conrad Carbon % d.w.	0.17	0.06	...
Saponification No.	61.9	36.3	37.8
Appearance	Clear	Clear	Clear

ing weight, the plate was tinned as "C" type plate which calls for an aim of 1.0-pound per base box and minimum spot of 0.75-pound per base box. Coating weight tests were run at least once each turn during the test, and were found to average in the range encountered using palm oil.

Lacquer adherence of the test plate was evaluated using the standard drop test with phenolic lacquer. Of 34 strips tested, only four showed any spots peeling. These four had only one or two spots each with a lacquer adherence rating of one, which indicates very slight peeling.

The same test sheets from which the lacquer adherence strips were taken were heated for 30 minutes at 400°F (standard bake test). None of the sheets showed any yellow or brown stains. Compared to regularly run hot dip sheet, the test sheets appeared much brighter after the bake test.

Porosity tests were made on two sheets each of the test plate and plate produced using palm oil. Tin-coating weights of these sheets and porosity were found comparable as shown by the data in Table I.

The composite of production testing of the new Shell tinning oils shows every indication of their being satisfactory replacement materials for palm oil in hot dip tinning—both article and continuous sheet operation.

Further Testing Contemplated—Further full-scale field testing on sheet production is contemplated for

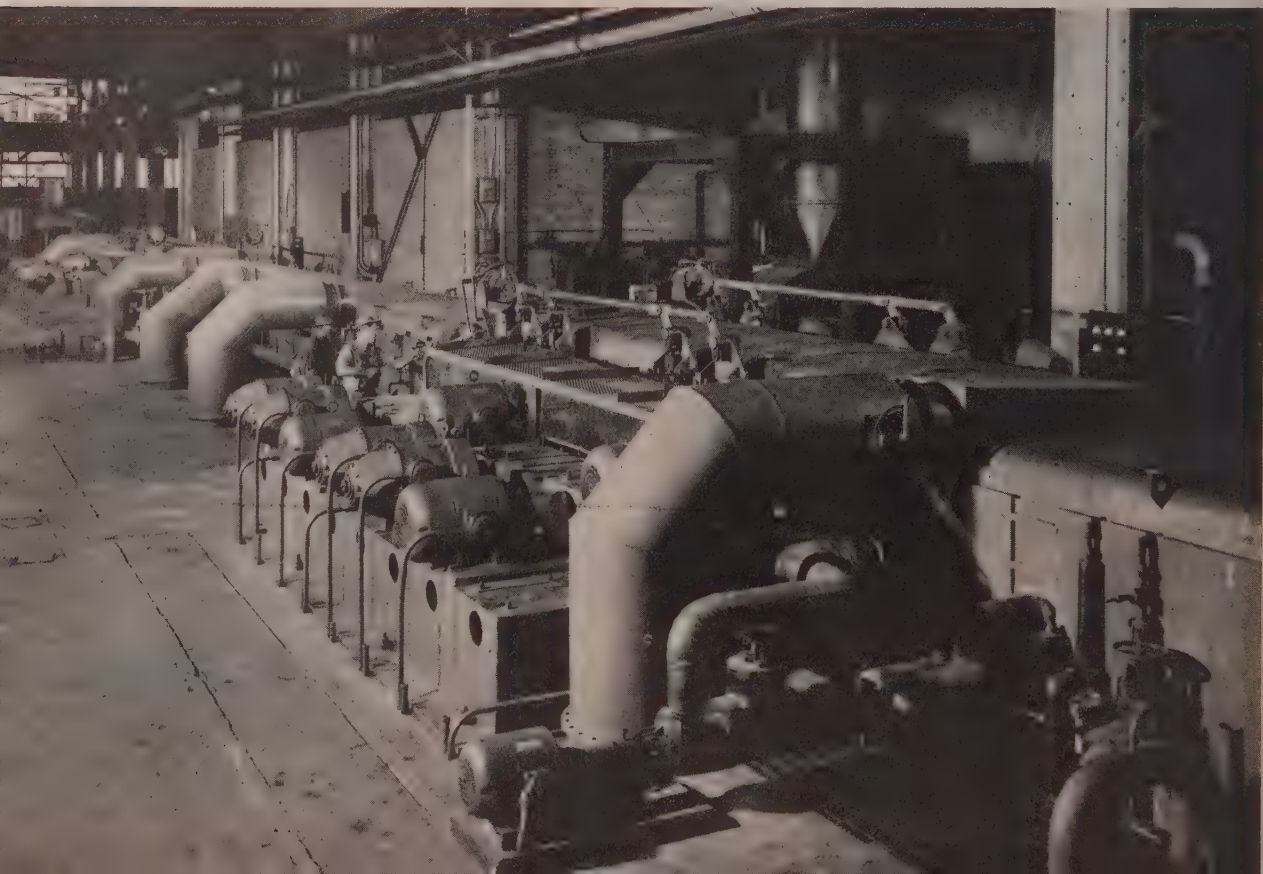
the purpose of ascertaining the economics of the new oils. It is recognized that palm oil saturated middlings and spent palm oil both have an economic value as materials for resale in other markets.

Since the newly developed tinning oils do contain petroleum constituents which many governmental agencies prohibit in cattle feed, it is doubtful that bran or middlings so contaminated can be resold for animal feed. However, test indications to date with the new mineral-base oils show a 50 per cent saving in bran consumption at the tinning line which, of course, minimizes this difference. Sawdust or some other low cost nonedible branning material can be substituted for middlings in the event that branning lines are employed. However, many plants now use alkaline wash cleaning which precludes any need for consideration of the economics involved in use of bran.

Resale of spent palm to process industries is another traditional avenue of economy probably not open to the new mineral-base oils. Preliminary studies of the new oils, taking into account the effects of the factors mentioned, however, are highly encouraging. Taking even the most conservative view of the matter, there is every evidence that the new oils can be made available commercially on a basis of saving and improved performance to the industry.

Grinding Stainless Steel—Another use of palm oil in the steel industry has been for grinding and polishing stainless steel sheets. This is done on endless belt type grinding machines (Please turn to Page 124)

Fig. 3—Cleaning facilities for removal of palm oil from strip



MACHINE TOOLS TODAY: The title of this item is the name of a publication sponsored by National Machine Tool Builders' Association, 10525 Carnegie Ave., Cleveland 6, O., a copy of which has just been sent to me for review.

This 24 page, 8½ x 11-inch book, covering as it does by words and photographs the "five basic arts" of mass production machining, does one of the most forceful jobs I have yet experienced in answering the big question, "What is a machine tool?" Whether they know it or not, a lot of people would have a better understanding of the present and future possibilities of our industrialized economy by having the correct answer to that question.

As the book says: "The economies of mass production, resulting from the use of modern machine tools, have made thousands of products available to all at moderate cost and have provided work for millions in the cities, towns and countryside—millions who today would be unemployed if the production methods of 50 years ago were still in use. Without machine tools, our standard of living today would be approximately that of 1850."

After explaining in simple terms and with the help of action photographs, the five basic arts of drilling and boring, milling, turning, planing and grinding, the book goes on to cover with equal clarity the nature of the machine tool industry. Subjects covered are: Concentration of plants; management and personnel; specialization; development of new designs; methods of manufacture; life of machine tools; sales and markets; selling methods; how machines make jobs; how they improve standard of living; tools for reconstruction; and machine tools for defense. There are themes for strong sermons in every one of these essays.

Those of us who are close to the machine tool industry sometimes find ourselves "with our noses so close to the abrasive wheel" that we lose the overall perspective. In that position we are in no condition to appreciate the overall significance of the machine tool industry today. In that position we certainly cannot do a good job of explaining it to others—including detractors. This book will help all of us to understand the machine tool industry better and thereby to spread better understanding of it throughout our country and the world.

GAGING ON THE FLY: Ever since Eli Whitney got interchangeable manufacturing under way as a means of making more goods for more people, there has been a constant race between "methods of making" and "methods of measuring".

Like the race between makers of armor plate and makers of munitions for puncturing armor plate, and the makers of burglarproof safes and the gentry devising tools for opening them, the advantage first has been on one side—then on the other.

In the mass production industries the time long since has passed when inspectors could say: "Stop the machines, hold everything until I measure up your work!" At the same time, machines have developed to such a point that defective work piles up

Seen and Heard in the Machinery Field

By GUY HUBBARD
Machine Tool Editor

literally by the barrelful if not caught and corrected immediately.

Continuous gaging—"measuring on the fly"—of rolled steel sheets long has been commonplace in the steel industry. Similar techniques are somewhat newer but nonetheless vital in the metalworking industry.

The extent to which pure science is being combined with old-fashioned Yankee ingenuity in the field of automatic and continuous gaging of machined parts does credit to the tool engineering profession. It is the key to success of 1949 automobile production.

STIFF JELLY: When I heard a machine tool salesman—one of the enthusiastic type—describing a powerful new model as being "absolutely rigid", it brought to mind some words of wisdom uttered 36 years ago by the late Forrest E. Cardullo before a class in machine design at New Hampshire State College.

Professor Cardullo, who later was for many years chief engineer of G. A. Gray Co., Cincinnati, wanted to drive home to us the fact that there is no such thing in machine construction as "absolute rigidity". In his homespun manner, he went about it this way.

"After you have figured it all out and done all the things that books tell you to do, forget the figures and the books and try to imagine what that machine frame you have designed will do if made of stiff jelly instead of cast iron. In other words do your cast iron thinking in terms of good stiff jelly because that is exactly what cast iron or any other so-called 'rigid' material is.

"If your thinking in terms of jelly is straight, and your practical judgment of the stresses to which the frame will be subjected in use is good—and you know somewhere near how much flexing will be allowable in your 'rigid' machine, there is a possibility that some day you may become a machine tool designer worthy of that name."

In these days when the effect of stresses is studied by means of transparent models viewed in polarized light, and light wave measuring instruments allow measurement of deflection of a 4-inch steel bar under thumb pressure, the soundness of Forrest E. Cardullo's "stiff jelly" reasoning becomes thoroughly clear—at least it does to engineers.

Real criterion of enamel adherence is performance of enameled parts in assembly, transportation and service. Measured by this standard, cover coat enamels applied directly to special steels show outstanding performance to date

Preparing Special Steels

By FRANK R. PORTER
Inland Steel Co.
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FOR ENAMELING

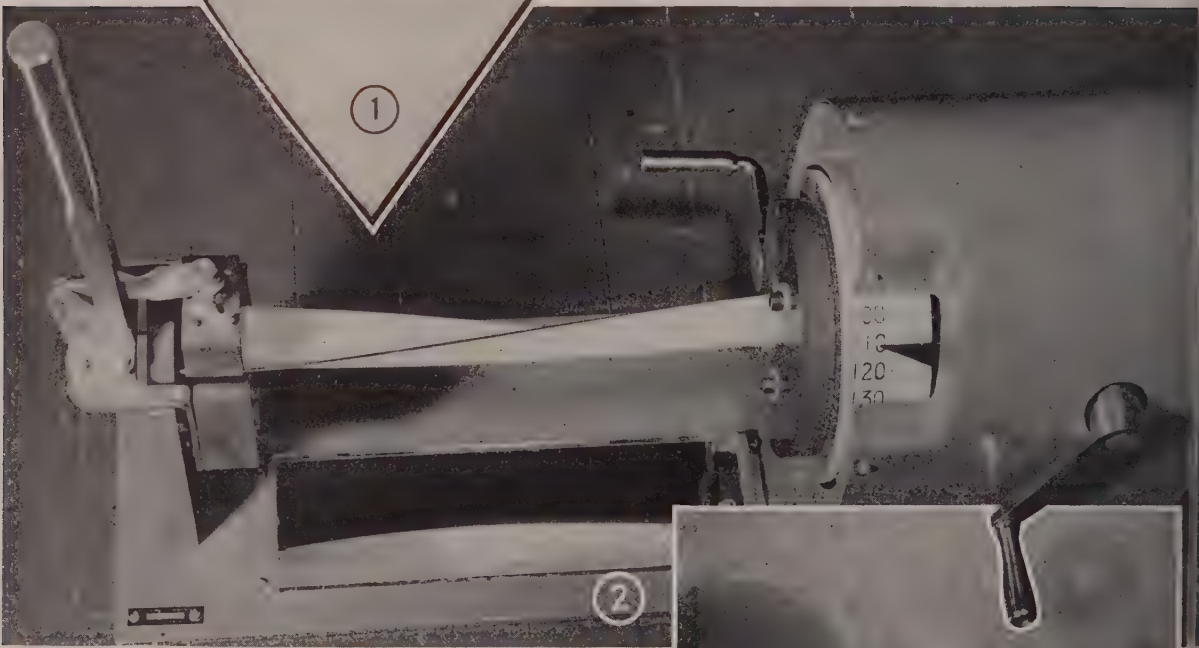


Fig. 1—Enameled titanium enameling steel panel, bent to 90 degrees after enameling without enameling failure. Titanium acid resisting enamel was applied directly to the steel

Fig. 2—Torsion test showing enamel failure at 110-degree twist. Enamel was applied directly to the steel

Fig. 3—Photomicrographs of iron oxide layer developed by (A) cobalt ground coat enamels and (B) acid resisting cover coats. Box furnace firing



THREE factors in large measure cause the majority of enamellers' headaches: Reoperations, warping and chipping. The first two are largely responsible for the last. Certainly, the thicker the enamel coating, the more likelihood of breakage, and many of us also know from experience the results of forcing and fixing into place a warped piece of enameled ware; but few of us realize how much more flexing and torsion really thin enamel coatings can take than those that are of, let us say, normal thickness.

Laboratory tests have revealed that if enamel coating is under 0.005-inch thick on a test strip, in the form of an angle, the strip can be twisted 90 degrees before the coating breaks. Angle of twist to breakage falls off rapidly with increase in coating thickness. Thin coatings then are quite essential, and the frit producers have kept abreast or ahead of demands by developing cover coat frits so highly opaque that satisfactory reflectance in the fired coating is obtained with as light an application as 20 grams per square foot—a coating approximately 0.004-inch thick. This is a remarkable achievement, and the frit suppliers deserve a great deal of praise for it.

Highly opaque frits are of little benefit if several coats must be applied—that is to say, if we are to take full advantage of the superior properties of thin enamel finishes, we must drastically reduce, or eliminate if possible, enamel shop reoperations. There are several sources of defects which lead to reoperations, some of which occur in the enamel shop and therefore are controllable by the enamel shop personnel, such as poor housekeeping and careless handling. Others, however, cannot be controlled by the enamel shop, these being the quality of the raw materials, and it is at this point that special steels or irons made especially for enameling come into the picture.

Prior to 1914 the sheets available to the enameling industry could be largely classed as mild steel. At about that time Armco Steel Corp. began the production of Armco ingot iron for this industry, and

the chemical analysis of this product approached that of pure iron. The product, as now made by most of the principal steel producers for the enameling industry, is universally known as enameling iron, although marketed under various trade names. Enameling iron is very low in metalloids, an average chemical analysis showing it to contain not over approximately 0.15 per cent of the common elements which include carbon, manganese, phosphorus and sulphur.

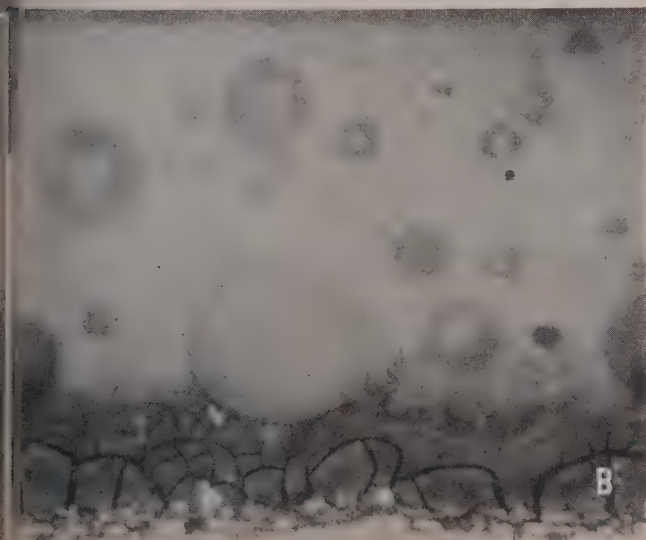
Enameling Iron—Introduction of enameling iron some 30 years ago was of tremendous importance to the enameling industry. Superior enameled ware was made available. Warpage was reduced and there was less enamel chippage because thinner enamel coatings were made possible by the more refined base metal. However, this improved base metal still left something to be desired; there was still more warpage than desired; there were more enamel reoperations than desired; and white enamels could not be applied directly to the metal with satisfactory results.

This last item is of particular importance to the entire enameling industry and has been the source of much study and experimentation for a good many years. If white enamels can be applied directly to the metal, the industry has not only the advantage of thinner coatings but has an opportunity to expand into some fields now using organic finishes where enamel finishes are more desirable because of their all around superior qualities.

Titanium Enameling Steel—Several years ago this search for ways and means of applying enamel cover coats directly to the metal base was intensified, and the result has been the appearance of at least two special products which have been used in production quantities for the past 2 or 3 years. One of these is titanium enameling steel, which will form the basis of this discussion. In general, special sheets are designed for application of cover coats directly to the base, with less enamel reoperation and with less sagging and warping than with metals heretofore used by the enamel industry. Titanium enameling steel was mainly designed for use with the standard "high temperature" cover coats, and at least one of the sheets with the newer "low temperature" enamels.

Many thousands of tons of these special metals have been used in production, the results of which are highly encouraging. Reoperations have been noticeably reduced, thinner coatings have resulted, and there has been reduced sagging and warping. A good case in point with relation to reduction in enamel thickness is the report of a manufacturer who has produced more than 35,000 parts from the titanium steel, to which titanium oxide enamel has been applied, with an average thickness of 0.0065-inch. This compares with approximately 0.015-inch for the standard enameling finish applied to enameling iron for similar parts.

Ultimate aim in all of this work is to obtain a finish with a thickness equivalent to that of organic finishes, that is to say, of approximately 0.003-inch. One would naturally expect that for the application



of such thin coatings the surface would have to be substantially free from deep scratches, die marks and other irregularities, which normally may be covered by standard coatings—ground coat plus cover coat. Experience has shown this to be true. Where metal finishing is required, it may be found necessary to select a finer abrasive or cutting medium than normally used.

Our experience with welded areas in the titanium enameling steel can be briefly summarized as follows, with titanium steel rod or strip being used in all cases when a rod is required:

1. Zirconium Enamels: Oxyacetylene welding has not proved satisfactory because the weld areas pick up sufficient carbon to cause enamel boiling and blistering.

Oxyhydrogen welding is satisfactory for production work with parts fabricated from 20-gage metal. It is my understanding that 18-gage is approximately the heaviest that can be satisfactorily welded with oxyhydrogen. The flame is not so hot as the oxyacetylene flames. When hydrogen is substituted for acetylene, a larger size tip is also employed than for acetylene.

Arc welding is not satisfactory with the use of zirconium enamels. Spot and seam welds enamel satisfactorily.

2. Titanium Oxide Enamels: All types of welds referred to above will enamel satisfactorily using the titanium oxide enamels.

Before leaving the general subject of fabrication, it should be noted that the titanium steel, at least, is stiffer than enameling iron and it may therefore be necessary to use a restrike operation on certain parts,

the flanges of which are subject to spring-back, or allow for it in designing dies.

Cleaning—Success of the one-coat application depends greatly upon how well the part is cleaned. The job must be thorough; removal of grease, oil, drawing compound, etc., must be as thorough as for electroplating. A trace of oil left on the surface will not only interfere with nickel deposition, if this is required, but will also result in blistered or pitted enamel which will require the application of a second coat to cover, and therefore defeat the one coat aim.

Parts should be cleaned immediately after fabrication and prior to their delivery to the enamel shop. This not only removes lubricants while they are readily removable, but also lightens the burden of the enamel shop cleaning process. I know that many of you are making use of this sort of arrangement and I am certain that you have found it beneficial.

In passing, it should also be pointed out that thorough cleaning prior to welding improves the enamelability of the weld area immeasurably. If we are to have high success with the one coat application directly to any special metal, thorough cleaning is a must.

Nickel flashing, as indicated above, is necessary for enamel adherence when using the titanium steel, and a certain minimum thickness or weight of deposit limit must be maintained for satisfactory results. Experience to date sets this lower limit at 0.08-grams per square foot of surface. The range for weight of deposit has not been established. One enameling shop finds by experience that the range is quite close, from approximately 0.08 to 0.10-grams. Another has found as much as 0.13-grams not detrimental. No doubt the type of enamel and firing conditions have some bearing on the range. Our laboratory experience, with an electric furnace having hearth dimensions of 24 x 54-inches, has been that deposits of as much as 0.30 grams are satisfactory for both zirconium and titanium oxide enamels.

Rate of deposition of nickel varies greatly with variation in temperature of the nickel bath. At 190° F, about 30 per cent more nickel is deposited than at 170° F. Agitation of the bath also increases the rate of deposition.

Adherence—Appearance of the bonding layer is radically different from that obtained with cobalt ground coats, and the thickness of this layer also is much less than obtained with ground coats. If we were to measure the adherence of these coatings on the basis of the appearance of the "break" obtained by the usual falling weight-plunger-die method, the results would surely be poor. However, if we increase only the diameter of the die of this impact apparatus, we get little or no break; and the evaluation of the adherence goes up considerably. In fact, the single coat applied directly to the special metal breaks less than does ground coat plus one cover coat with this setup.



Fig. 4—Photograph showing difference in size of chipped areas during impact tests. (A) Ground coat plus titanium acid resisting enamel on standard enameling iron. (B) Titanium acid resisting enamel applied directly to titanium enameling steel

From data presented by the author before the 10th annual forum, Porcelain Enamel Institute.

New Approach to

Single Phase Welding

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General Electric Co.
Schenectady, N. Y.

Possibility of greatly improving process of spot welding aluminum and its alloys in particular and of enhancing resistance welding in general, is demonstrated by an investigation into the effect of varying the current envelope of a standard 60-cycle spot welder

INITIAL application of current to a spot weld may have a decided effect upon obtaining satisfactory welds in production. Where wave shape is readily controlled, as it may be with capacity-stored energy equipment, it has been demonstrated that the wave shape affects the welding characteristics. Purpose of the investigation, results of which are reported here, was to study the effect of varying the envelope of the current of a standard 60-cycle spot welder during the first few cycles of a spot weld. Slope of the envelope or rate at which the current rose to welding value, was adjustable in terms of cycles to reach final current.

Spot welding aluminum and its alloys is one of the most difficult production jobs involving resistance welding. The major portion of this investigation, therefore, was devoted to spot welding 24ST aluminum in four thicknesses: 0.025, 0.040, 0.064 and 0.081-inch. 52S aluminum 0.062-inch thick was also welded.

Short Tip Life—One serious problem encountered when spot welding aluminum is the relatively short electrode tip life. It is believed that pickup starts from the very first spot and becomes progressively worse. Electrode tip life is a function of tip pickup or deposition of aluminum on the tip rather than deformation of the tip surface—as in the case when spot welding ferrous materials. This investigation resolved itself into a study of the effect of controlling the initial application of current on the electrode tip life.

Two press type air-operated spot welders were used. One with a low inertia head with air-lock on the ram, rated at 150 kva was used on 0.025, 0.040 and 0.064-inch 24ST. The other, a 300 kva high inertia head was used on 0.081-inch 24ST and 0.062-inch 52S aluminum; 0.064-inch 24ST was also checked on the 300 kva machine. Both machines had synchronous precision electronic controls.

Supplementary equipment used in conjunction with the standard control panel and referred to as the slope control is in effect a variable resistor in series with the heat control potentiometer. Variation of resistance is obtained by varying the bias voltage of two GL-502A thyatrons connected in inverse parallel. Fig. 3 illustrates schematically the functioning of the slope control.

Electrodes used were RWMA class 1 of the cadmium-silicon-copper type. Several dome radii were tried initially and it was found that a 3-inch radius dome worked satisfactorily on all gages; since it is a standard radius for other work this radius was used throughout this investigation. The water hole was drilled to within $\frac{1}{4}$ -inch of the welding surface. City water was circulated through the electrodes at an approximate rate of 1 gallon per minute. Cleaning the electrodes was accomplished by immersing the tip in a solution of sodium hydroxide. This removed all the aluminum deposited on the tip and the electrode was ready for further use. If the pickup was too severe, pitting would appear after dipping, necessitating a machining operation.

Cleaning Steps—Following steps were used to clean the aluminum:

1. Vapor degrease
2. Alkaline cleaner at 180° F
3. Cold water rinse
4. 15 to 20 seconds in acid deoxidant at 70° F
5. Cold water rinse
6. Hot water rinse
7. Dry by air blast

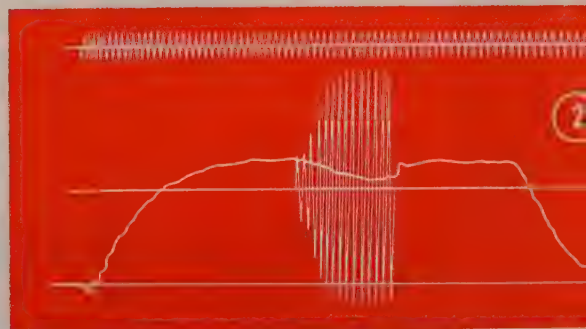
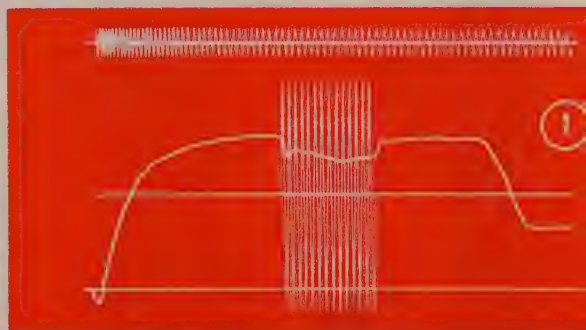


Fig. 1—Current force trace without slope control
Fig. 2—Current force trace with slope control

This cleaning produced a surface whose resistance measured approximately 5 to 10 microhms. The surface resistance was measured by clamping two pieces of aluminum between two current carrying electrodes and measuring the drop across the two pieces. Clamping pressure was 100 pounds. The equipment is so designed and calibrated as to read the surface resistance direct in microhms. The cleaning process used leaves a protecting film on the surface so that the surface resistance remained constant over a considerable period of time. The welding, therefore, was not done immediately following the cleaning.

Welding procedures were established which produced welds whose strength was equal to or greater than those called for in the Air Force—Navy Aeronautical Specification AN-W-30. Cross-section and x-ray examinations were used to determine the soundness of the spot welds. Welds produced in the test specimens used to determine electrode tip life meet the requirements of the AN-W-30 specification. Welding procedures used are given in Table I. To obtain comparable welds without the slope control the same procedures were used, except the weld time. By reducing the weld time two cycles, approximately the same weld was obtained. This would indicate that the total heat input was approximately the same for comparable welds.

Test Run—Due to the difficulty of establishing some criterion by which the pickup could be measured it was decided to continue a test run until the first indication of sticking to the electrodes occurred. The test runs as indicated in Table II were con-

Mat'l.	Thick- ness	Weld Time	Electrode Force	Starting Current	Welding Current	Weld Strength	Cycles To Reach Final Current
24ST	.025	10	700	6000	25000	350	4
24ST	.040	10	900	6000	28000	550	4
24ST	.064	10	1100	8000	31000	1000	4
24ST	.081	15	2500	8000	40000	1400	5
52S	.062	10	1000	9000	31000	900	4

Time Cycles	Without Slope Control			With Slope Control		
	Dia. of Imprint	Current Density Amps/Sq. In.	Unit Force Lbs/Sq. In.	Dia. of Imprint	Current Density Amps/Sq. In.	Unit Force Lbs/Sq. In.
1	.19	770,000	12500	.14	285,000	26,000
2	.19	770,000	13100	.15	250,000	22,800
3	.20	700,000	11800	.18	695,000	15,500
4	.20	700,000	11200	.20	700,000	14,000
5	.20	700,000	11200	.20	700,000	12,500
6	.20	700,000	11200	.20	700,000	11,200

Mat'l Thickness	Number Of Spots Before Sticking Occurred	
	Without "Slope Control"	With "Slope Control"
.025	15	300
.040	25	825
.064	41	1125
.081	55	1700*
* Tests Discontinued Before Sticking Occurred. On 52S Aluminum		
.062	60	450

tinued until the slightest evidence of sticking occurred. This sticking could evidence itself by the work following up with the upper electrode or requiring the slightest prying to move it on the lower electrodes. The specimens used were only 4 inches square and therefore the sticking did not have to be severe to become apparent. Without the slope control, however, the sticking was usually rather severe when it did occur. Table II indicates the results of these life tests relative to electrode tip life.

On the 0.081-inch material there was no visible change on either work or electrodes between the 1000th and 1700th spot. The test was discontinued at this point believing that the test could go on indefinitely as far as the pickup was concerned. Data presented in Table II indicate that there is a decided advantage to be gained by using the slope control.

To establish current densities and unit pressures as the weld progressed, the electrode imprint on the work was studied along with the oscillographic trace of the current and force. Data tabulated in Table III were taken on 0.032-inch 52S aluminum. Three-inch radius domed electrodes with 400 pounds electrode force was used. The welding current was 22,000 amperes. The imprint of the electrodes on the work without any application of current measured 0.080-inch in diameter.

Current densities and unit force

were calculated from the current and force illustrated in Figs. 1 and 2 which are actual traces of the current and force of this weld.

It is generally agreed that the heat developed between work and electrodes is directly proportional to the current density at this point and also that this heat is inversely proportional to the unit pressure. It is also true that the deposition of aluminum on the electrodes is directly proportional to the temperature at the point of contact of the electrodes and the work. From Table III it is seen that when the initial current is not suppressed the current density is considerably higher at the start than the current density after the electrodes have finally "seated" themselves and the weld begins to grow.

Current Density Reduced — With the "slope control" the current density during the first cycle is roughly one-third that shown without the "slope control". Conversely, the unit force is higher with the "slope control". Thus, the temperature at the point of contact of electrodes and the work is considerably lower when using the "slope control" and the aluminum pickup on the electrodes is greatly reduced. This theory is borne out by the data in Table II where it is shown that from 20 to 25 times the number of welds can be made with the "slope control."

Some preliminary tests have been made on the projection welding of steel using the "slope control." It was demonstrated that projection welds can be made without any of the customary expulsion at the start of the weld. This tends toward sounder welds and eliminates the hazards accompanied by expelling molten metal. It is believed that the "slope control" will enhance the consistency of multiple projection welding.

From data presented by the author before the American Institute of Electrical Engineers, Detroit, December, 1948

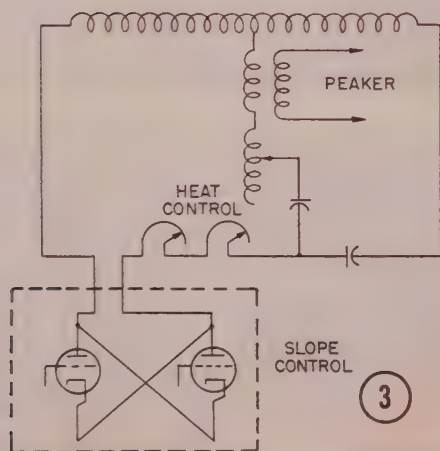
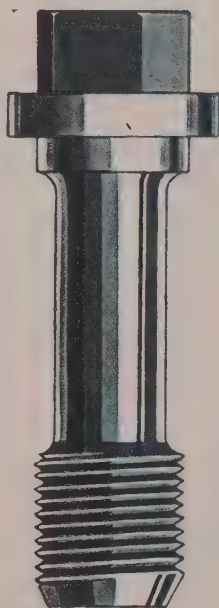


Fig. 2—Function of slope control is illustrated here



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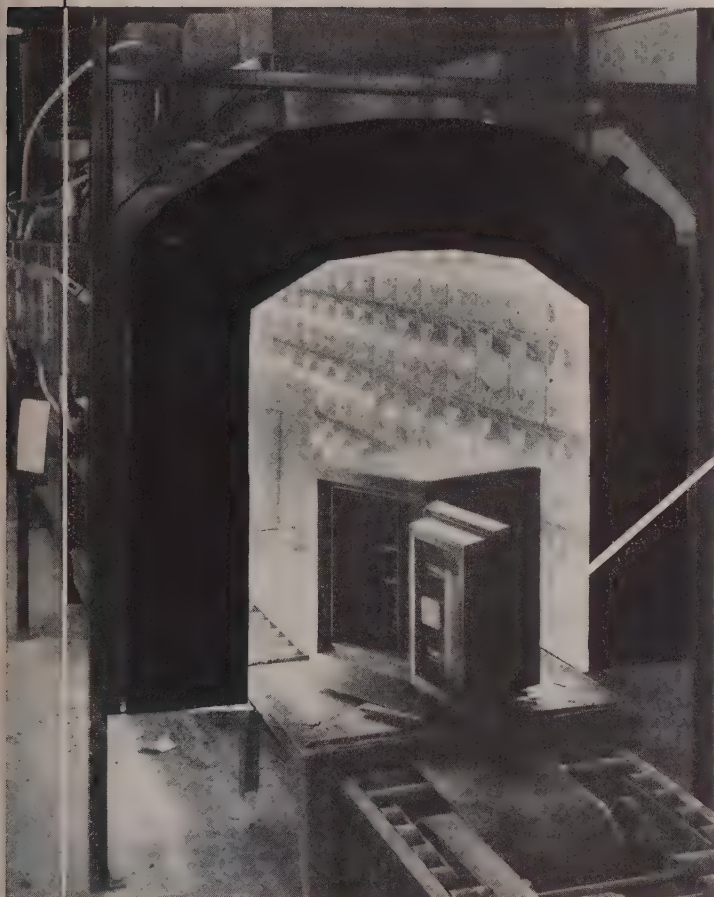


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heat transfer and increasing draft loss. For this reason, openings in checker work must be as large as practical. Checker condition has a profound influence on furnace performance, and policies followed in checker maintenance are extremely important.

Heaviest component involved in an open hearth charge is air since 2 tons of air are consumed for every ton of steel produced. All other charge materials are subject to close control since they can either be weighed or measured, but air, heaviest of all and most critical in its effect on furnace performance, is extremely difficult to control because of many conditions in the furnace system which are subject to continual change. Variation of air weight with atmospheric temperature, which means a corresponding variation in amount of oxygen delivered to the furnace, is an influence, not often given

Oil, alone, is an excellent open hearth fuel being used in many plants at the present time. It can readily be vaporized by steam or air and requires no high preheat. In addition it is of high calorific heating value—150,000 to 155,000 Btu per gallon. The sulphur will average 0.8 per cent. Bunker C oil has a specific gravity of 10 to 12 American Petroleum Institute. It is usually quite regular in quality although recently high sulphur oils from the southwest, containing as high as 2 per cent sulphur have created a serious operating problem because of this high sulphur content. It is said that it may be possible to remove such sulphur from this oil in the future at a cost of about 1/2 to 1 cent per gallon. A furnace can be operated uniformly and rapidly with fuel oil. On the other hand, the flame is intense and sharp; velocity of flame passing over bath of metal is high; and great care must be exercised not to burn too much oil per hour (a weakness of first helpers) or furnace repair costs will be excessive, and metal may be over-oxidized.

It was pointed out earlier that the differential between steel tapping temperature and failure point of refractories is only 250° F. Because of this narrow limitation, at high temperature, it is highly important that all heat wasting influences be eliminated or at least be held to the lowest possible level. The most common cause of heat waste is improper air supply, either too little or too much. Insufficient air supply is disastrous since flame development over the hearth is retarded to a point where melting slows down or stops and unburned fuel passes to the checkers where secondary combustion may cause severe damage. In the open hearth operation a certain amount of excess air is necessary for good melting performance, but any excess of air above the right amount has the double effect of increasing flue gas losses and reducing air preheat temperature.

At elevated temperatures required for open hearth melting, a very considerable proportion of the fuel's heating value passes out with flue gases as sensible heat. Heat available for useful work is the difference between the heating value of the fuel and flue gas losses. Superiority of fuel oil over producer or natural gas is readily evident when a comparison is made of available heats. On the basis of 3200° F, 25 per cent excess air, and preheated air at 1600° F, the available heat of fuel oil is 37 per cent, natural gas

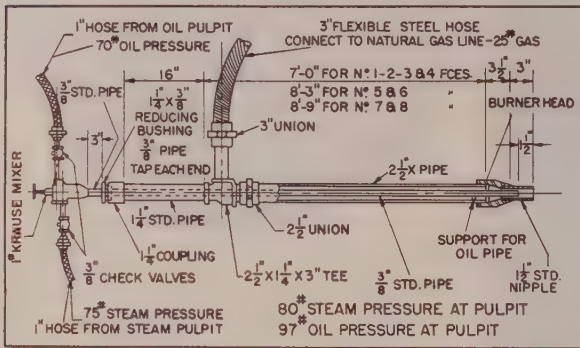


Fig. 42—General arrangement of natural gas and oil burner for open hearth furnaces

serious consideration, which may have considerable effect on furnace performance.

Fuels usually employed in open hearth steel melting, in their order of importance are fuel oil, natural gas, producer gas, coke oven gas and tar. Twenty years ago producer gas was the predominant open hearth fuel, but the advent of the oil cracking still and the distribution of oil refineries in areas of large gasoline consumption brought about widespread supplies of heavy fuel oil which proved so much superior for open hearth melting that oil has largely supplanted producer gas.

Natural gas, because of its local availability, is used exclusively by a few steel plants as an open hearth fuel—and it gives good results.

In other plants a high percentage of natural gas with 6 to 10 gallons of fuel oil per ton is used in a combination burner during the meltdown period of a heat. The ratio of natural gas to oil is decreased in the refining state. Such combination fuel works very well. Natural gas, being free of sulphur, is desirable in the melting stage when the charge most readily absorbs sulphur. Its high calorific value makes fast melting possible. Sulphur in the oil is not so detrimental in the refining stage when the slag protects the metal from sulphur absorption. The high speed flame from oil burning is suitable for bringing a heat of steel, particularly low carbon steel, up to tapping temperature.

FUEL ANALYSES Fuel Oil

Carbon	88.5%
Hydrogen	9.9%
Sulphur	0.8%
Undetermined	0.8%
Specific Gravity—11° A.P.I. or 8.25 lb/gal	
Viscosity —125 sec Furol at 122° F	
Heating Value —152,000 Btu/Gal Net	

	Natural Gas	Coke Oven Gas	Producer Gas
Carbon dioxide	0.2%	2.5	5.7
Illuminants .....	...	3.9	2.6
Oxygen .....	...	0.8	0.4
Carbon Monoxide .....	...	6.2	22.0
Hydrogen .....	...	47.7	10.5
Methane	83.5%	29.7	2.6
Nitrogen	3.8%	9.2	58.2
Ethane	12.5%	...	0.0
Specific Gravity	0.63	0.4	...
Heating Value	1060 Btu/cu ft gross	540 Btu/cu ft gross	145 Btu 1 cu ft
	970 Btu/cu ft net	480 Btu/cu ft net	

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27 per cent, and producer gas 24 per cent. These figures indicate that almost two-thirds of the heat from fuel oil and three-fourths of the heat from producer gas passes out through the stack. It follows that any condition which increases the stack loss may have a critical effect on melting performance. This means that either the melting rate will drop or that additional fuel must be burned to make up the loss which increases fuel consumption and shortens furnace life. An analogy which is familiar and which illustrates the principles involved, is the oxy-acetylene cutting torch—if too much oxygen is used, the torch backfires—if too much fuel is used, the torch will not cut—the proportion of each must be exactly right if the torch is to cut properly. The same principle applies to open hearth melting except that deviations from the best practice are not so readily apparent and may continue uncorrected for a long period of time.

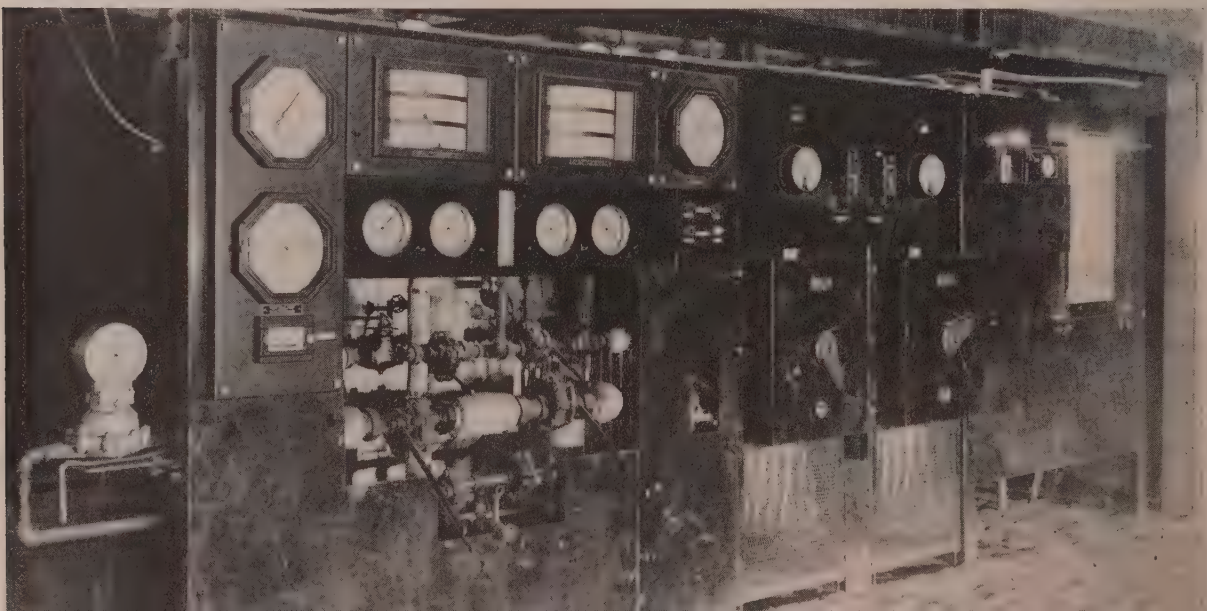
In comparison with most combustion systems open hearth combustion is distinctly unusual. Burners are usually designed to develop a maximum amount of heat in a given space in a minimum length of time. An open hearth burner built on such a principle would merely burn up one end of the furnace while the other end would freeze up. In a furnace with a hearth 15 feet wide and 40 feet long, the problem is to develop a flame which will as nearly as possible transfer heat evenly over the entire width and length of the hearth. Usual system employed is to direct a highly atomized jet of fuel close to and over most of the hearth length. The combustion air stream is directed at relatively low velocity over and around the fuel jet so that combustion progresses over the hearth length as more air is entrained into the fuel stream. In other words an open hearth burner system must be tailored to fit the hearth. A combination of burner jet size, steam and oil orifices, and steam and oil pressures, is designed to produce the proper fuel jet. Furnace and contours are worked

out to introduce the air supply needed. (See Figs. 41 and 42)

In summary, steel melting in an open hearth furnace involves a complicated and critical combustion problem. Limitations established by furnace refractories, steel melting temperature, grades of steel to be made, and heat available from the fuel, are such that any deviation from best melting conditions has a decided influence on furnace performance which may be out of all proportion to the magnitude of the deviation. Influences causing such deviations may be fluctuation of fuel supply, fluctuations in air supply, too much or too little fuel, too much or too little air, too much or too little draft, leakage and consequent infiltration, obstructions in downtakes and flues, plugged checkers, water leakage into flues or checkers, unbalance between the two ends of the furnace in fuel, air, or steam—just to mention a few of the more obvious ones.

Control of the several variables in open hearth combustion presents a complex problem. Close, accurate control of most of them is a virtual impossibility. Fuel oil or natural gas can be metered accurately and a satisfactory flow controller can be worked out for either fuel. Combustion air, however, cannot be accurately measured since there are always openings into the air stream between the air inlet at the valve or stack and the furnace proper which will admit unmeasured air to the furnace. It is possible, by careful construction and maintenance, to limit amount of such "tramp" air to a fairly small proportion of the total air requirement so that a measurement of air admitted at the air inlet will provide a fairly close guide as to combustion air supply. A metering duct fitted with a regulating damper and a combustion air fan with sufficient static head to develop a measurable differential, installed ahead of the air inlet, will provide such a guide. This resulting measurement can be coupled up with the fuel measurement through a suitable control so that air supply can be regulated automatically in proportion to fuel as the latter is increased or decreased.

Fig. 43—Control instrument panel for a modern open hearth furnace



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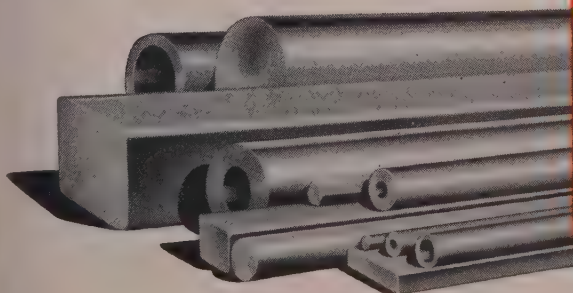
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Many people, who have struggled with the problem of combustion air control, have finally arrived at the conclusion that oxygen content of the flue gases leaving the furnace should be the best measure of fuel-air ratio. Certainly this relationship would be very useful inasmuch as the influence of bath reactions would be disclosed as well as the fuel-air ratio. Unfortunately the problem of collecting a flue gas sample from the intensely hot, fume-laden gases leaving the furnace has not yet been solved satisfactorily so all attempts to make use of an oxygen analyzer have met with difficulty—if not failure.

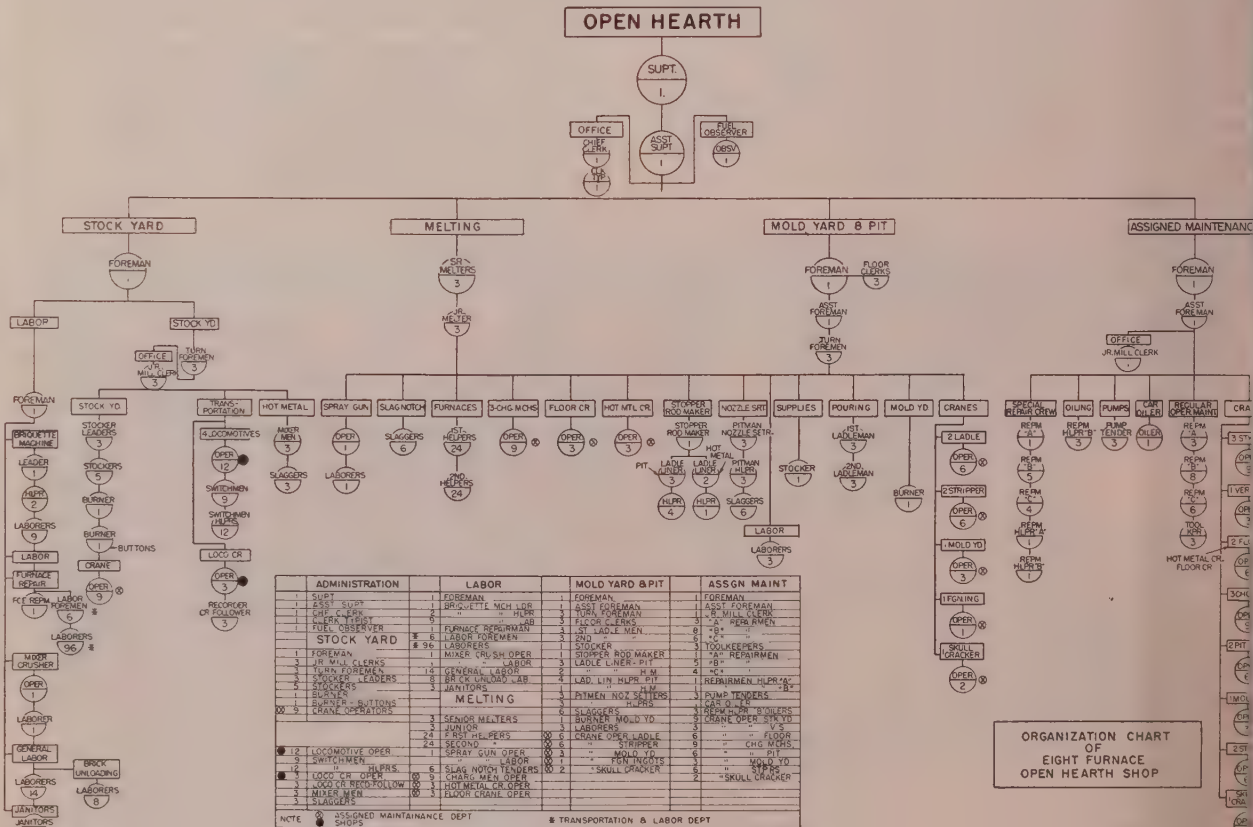
Another influence which has a critical effect on combustion air supply and flame development is furnace pressure. Incoming preheated air supply travels into and through the furnace chamber at relatively low velocity and under very low pressure so that it is quite sensitive to furnace pressure. If furnace pressure is high, say 0.08-inch water gage at the roof arch crown, the air stream is held back and quantity of air is reduced. In such case a strong whisp of flame can be seen at wicket holes of the furnace doors and around door frames. On the other hand, if pressure is held low enough that no whisp is seen around doors, the air stream enters the furnace freely and, in addition, cold air is drawn through all wickets and door cracks which plays no useful part in combustion and merely dilutes and cools outgoing gases. Two schools of thought exist with regard to furnace pressure. Those mindful of good

combustion, a sharp-working furnace, high production, and good fuel consumption like fairly high furnace pressure. Such conditions naturally result in an extremely hot furnace and tend to shorten furnace life. Some operators run for long furnace life and low repair costs and so maintain a low furnace pressure so that cool air is drawn into the furnace to protect refractories. Savings in repair costs in such case are gained at the expense of steel production and fuel cost. In face of the crying need for steel at the present time, the policy of highest possible steel production would seem to be desirable even at the expense of furnace repair cost.

The whisp of flame out of the wicket hole is the usual way a first helper judges furnace pressure, but this may be misleading since fumes from the bath may affect the flame appearance. A sensitive pressure recorder connected to some point in the furnace, usually the arch crown, will provide a more dependable measure of furnace pressure. Unfortunately such installations require frequent cleaning and maintenance under distinctly uncomfortable conditions so that considerable trouble is encountered in keeping them in operation. Automatic control of furnace pressure is widely used and many operators consider it their most valuable control.

Much attention has been given in recent years to roof temperature recorders and some installations of roof temperature control have been made by which the fuel rate was reduced automatically when destructive roof temperatures were reached. Such condition usually arises when the heat is almost ready to tap, and automatic cutback of fuel at such a

Fig. 44—Organization chart of an eight furnace open hearth shop



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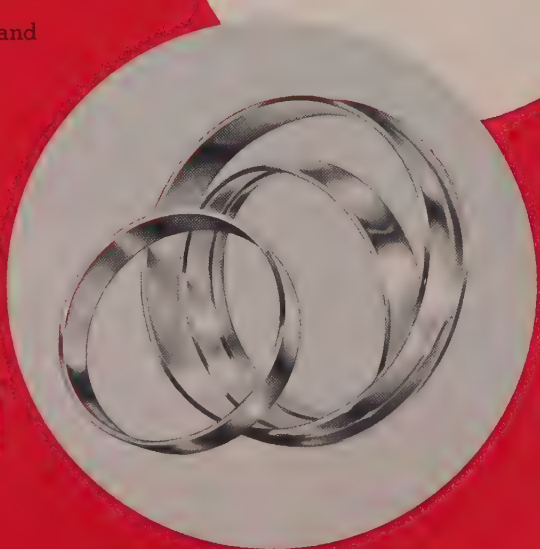


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period is quite likely to affect the heat time seriously. A roof temperature recorder can be a most useful tool to the first helper if it is arranged to cause an alarm when destructive conditions are approached so that he can adjust his fuel before too much damage is done. Installation of a roof temperature pyrometer presents a problem on many open hearth furnaces, and maintenance is apt to be difficult and expensive.

Most important consideration in developing good open hearth operation is intelligent personnel. The finest and most complete instrumentation and control setup that money can buy will not melt steel in an open hearth furnace. Also the most expert first helper cannot hope to get consistently good performance unless he has sufficient instrumentation to guide him in operation of his furnace. Equipment needed for proper control of an oil-fired open hearth furnace might be listed as follows:

1. Compact reversing equipment so arranged that reversals can be made easily and quickly. Each second of furnace time lost in reversal requires two additional seconds of burner operation to recover the heat lost. Automatic reversal equipment is useful provided no furnace time is lost in reversing. (See Fig. 43)

2. Fuel and air meters—together with means of adjusting fuel and air flow easily and positively. Automatic control of air in response to fuel loading is useful and justifiable.

3. Means of preheating fuel oil and steam. Use of oil viscosity controllers by means of temperature regulation is gaining favor. Preheating of steam to 550° F is desirable in the interest of better atomization and decreased steam consumption. Pressure gages and thermometers to indicate flow conditions should be provided.

4. Draft gages to indicate drafts at various points in the system. A recording pressure gage to show furnace pressure and guide the first helper in regulation of draft. Automatic pressure control is well justified.

5. Checker pyrometers to show a relationship between checker heat transfer on the opposite furnace ends. Such pyrometers can be arranged to signal the first helper when reversals should be made in order to keep the two ends in balance. Automatic reversal can be arranged in response to such signals.

6. A roof temperature pyrometer should be justified in increased roof life.

One word of caution should be emphasized in connection with instrumentation and control. Any instrument or control that tells a wrong story, and makes a wrong movement, is worse than no control at all and may lead the first helper into real trouble. Maintenance of such equipment is usually a specialized job and should not be delegated to the regular maintenance organization. It follows that such equipment must be carefully engineered originally and that special provision must be made for competent help to keep it in proper operating condition. Expense so incurred should be returned many times over in increased production, lower furnace repair cost, and lower fuel consumption. In what is often termed "the

continuous open hearth process," patented by Talbot in 1899, a modified tilting open hearth furnace of large capacity, often holding 200 tons of metal, is used. Initial charge of scrap iron and pig iron is worked as usual. When ready to tap, about 50 to 75 tons are withdrawn. To the remaining molten metal is added roll scale, mill cinder or iron ore. After these materials are melted, hot metal and limestone, equal to the amount tapped, are added.

The slag now rich in oxides of iron, causes a violent reaction in the furnace, and metal refining is quickly affected. The percentage of impurities of the hot metal, which has been added, has been considerably reduced by dilution with the low carbon metal in the furnace. Additions are made at intervals, dependent upon the particular practice and violence

ACKNOWLEDGMENT

The author wishes to acknowledge the assistance of the following people in the preparation of his manuscript: His personal secretary, Miss Beatrice Byrd; C. E. FonDersmith, superintendent, steel plant production; V. W. Jones, superintendent, open hearth department; W. Bergmann, assistant superintendent, open hearth department; Thomas Portsmouth, plant photographer; H. P. Gaw, works metallurgist; A. Osborne, senior metallurgist; Hugh Barnes, consulting engineer and H. V. Flagg, combustion engineer

of reactions—and again 25 to 30 per cent of the charge is tapped. This procedure is repeated as often as the metal is sufficiently purified. At the end of the week it is usually the practice to tap the entire charge to permit necessary repairs to the furnace and bottom.

Such a practice produced high tonnages of ingots of questionable quality. Essential principle involved is an exceptionally vigorous rapid reaction brought about by use of slags abnormally high in iron oxides. This practice is no longer extensively used in the United States.

The Monell process is similar to the Talbot process and was used considerably several decades ago. It depends upon the strong oxidizing action of a slag, rich in iron oxides. It is carried on in a stationary open hearth furnace. Limestone and iron ore or scale are first charged into the open hearth furnace and heated almost to the fusion point. Then molten blast furnace iron is charged. The reaction which ensues is very violent. When it subsides, the heat is tapped. The very corrosive slag comes in contact with the bottom more than in the Talbot process, and this means that great attention must be given to bottom repairs. This process is seldom used in the United States at the present time.

The Bertrand-Thiel process was developed abroad, and is especially adapted to use of high phosphorus hot metal from the blast furnace. Two ordinary type open hearth furnaces are employed. Into the first is charged molten iron, or pig iron and scrap, iron ore, and limestone as in regular basic practice. In

this furnace all of the silicon, most of the phosphorus and part of the carbon are removed.

Metal is then tapped into a second furnace in which an additional charge of lime and iron ore, together with a certain amount of scrap have been charged. Care must be taken not to permit any slag from the first furnace to be poured into the second furnace.

Purification or refining and finishing of the heat are completed in the second furnace. In this process the highly oxidizing action of a slag, rich in iron oxides, is again made available—together with the first slag holding the major part of the phosphorus, thus eliminating any opportunity for its reversion or return to the metal.

C. R. Hook, chairman of the board of Armco Steel Corp., has said for years, "No great work was ever accomplished without much of co-operation. There can be no real co-operation until there is first confidence, based upon a cornerstone of understanding."

In a steel plant a great deal of the hard work has been eliminated by laborsaving devices and modern methods. Making of steel in the open hearth department is, nevertheless, an exact, hazardous and difficult job. It requires intelligence and physical fitness of a high calibre.

Each open hearth department has a slightly different type of organization. Fig. 44 shows a typical open hearth organization chart—indicating the great variety of operations carried on in a steel melting plant.

Co-ordination of all these activities so as to effect minimum delays and produce maximum tonnages of high quality ingots requires on the job planning and execution of such plans promptly and efficiently.

Development of written standard practice instructions for every detail of making steel has taken much of the mystery out of this art, but, at the same time, such practice has also assured to management greater quality uniformity from heat to heat, and month to month. These instructions are helpful and important to the stockyard, pit, furnace and maintenance men in better methods of work and job practices. Discussions with various groups of workers about personal relations in a steel plant, as well as selling workers that management has a personal interest in each of them, as individuals, by accident prevention, good housekeeping, and sanitation programs will pay dividends in better work and more contented workmen. Day-by-day contacts by management with workers in which they are informed of company problems and policies have been important factors in attracting workers of greater intelligence, skill, enthusiasm, and loyalty to the steelmaking profession.

The United States in 1947 supplied 56 per cent of all the steel made in the world. By far, the greater part of this vital production was made in the open hearth furnaces of our steel plants. Production of steel sets the pattern for our progress and prosperity.

Charles Kettering said recently, "The price of progress is trouble." At that rate, steelmakers are in the vanguard of progress because they know how to meet and overcome troubles.

With the increasing urge for greater comforts and higher standards of living by our expanding, virile population, there is every indication that steelmakers will keep ahead of the processions as demands for steel products multiply.

Device Safely Measures Heavy Direct Currents

Like another impossibility, perpetual motion, a static direct current transformer has long been sought. Achieving this objective for one special purpose is a new device called a Transductor which provides a simpler, safer way of measuring extremely heavy direct currents. In electrolytic plants, where currents of many thousands of amperes flow in a single bus, the traditional method of metering is to use a shunt in the bus and measure its voltage drop, this often meaning long leads and the placing of full bus voltage to ground on the meter. Both are sources of trouble and an actual hazard, the engineers state.

With the new device, developed by Westinghouse Electric Corp., Pittsburgh, the massive shunt is replaced by a special current transformer of the through type. The secondary winding is energized by alternating current of some convenient low potential, such as 110 volts. A change in direct current affects the reluctance

of the Transductor magnetic circuit and in turn the current flowing in its alternating current circuit. This alternating current is measured on a conventional ammeter calibrated in terms of the direct current in the heavy current bus. A change in alternating current energizing voltage affects the meter indication only slightly. The system, under practical plant conditions, is accurate to ½-per cent.

Pipe Friction Tables Made Available

Publication of a comprehensive tentative standard on pipe friction by the Hydraulic Institute, New York, involves the latest data used in the preparation of the charts and tables which are arranged in convenient and usable form. The friction loss for water is shown in the new tables in tabular form for pipe sizes from ½ to 84 inches. On the smaller pipe sizes, the tables are based on wrought iron or steel schedule 40 pipe, and for larger sizes, separate tables are given for each standard size for steel

and asphalt dipped cast iron pipe.

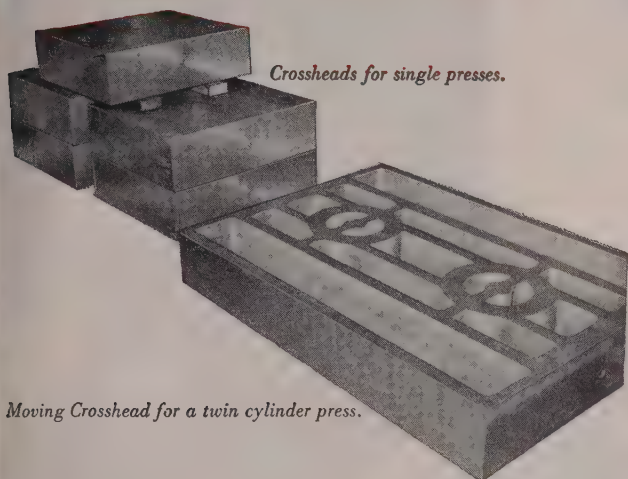
In each table, the flow in gallons per minute and cubic feet per second are shown with the corresponding velocity, velocity head and friction loss per 100 feet of pipe. For computing the friction loss for liquids other than water, a series of charts are provided for pipes ranging from ½ to 12 inches, showing the complete range of viscous and turbulent flow.

Also contained in the standard is a complete listing of losses in valves and fittings. Sectional diagrams of these items are shown to indicate their internal construction. Since there is a lack of uniformity, a range of loss coefficient is given.

—O—

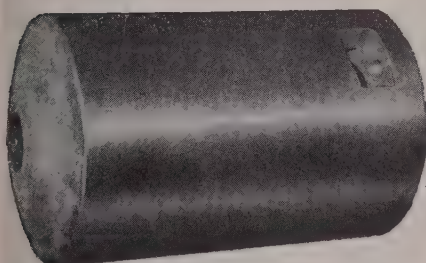
Simplified Practice Recommendation R235-48, copper and copper-alloy round seamless tube, is now available in printed form from the Government Printing Office, Washington, D. C. According to the Commodity Standards Division of the National Bureau of Standards, use of the preferred sizes listed in the recommendation should enable the tube mills to schedule longer runs with less frequent resetting of tools.

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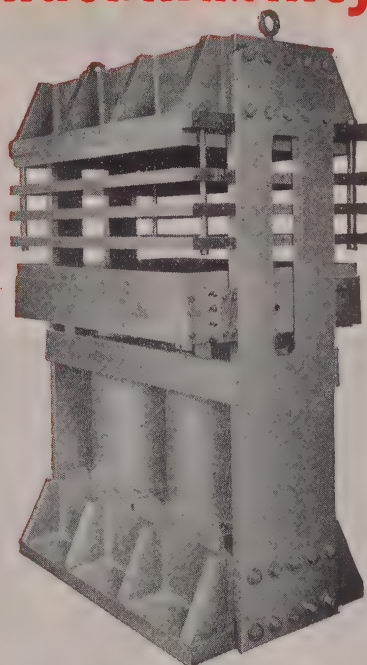


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SURFACE BROACHING

of Bearing Saddles Aids in Mass Production of Diesel Locomotives

Vertical duplex machine of extraordinary size features indexing arrangement which divides machining of radius among four cutter segments

AN interesting example of the manner in which the machine tool industry is co-operating with manufacturers of railway equipment to bring advantages of mass production to the railroads, is presented in this article and accompanying illustrations.

The principals in this case are American Broach & Machine Co., Ann Arbor, Mich., division of Sundstrand Machine Tool Co., builder of the 72-inch, 40-ton capacity machine and its special tooling, and American Locomotive Co., in whose plant in Auburn, N. Y. this equipment now is in successful operation on a production basis. An overall view of the

machine, as it appeared on the erecting floor of the builder's plant, already has been published on page 67 of the February 7, 1949, issue of STEEL.

The problem involves preliminary machining of quantities of heavy forged steel main bearing saddles, subsequently welded into crankcases of Alco railway diesel engines. Light finishing cuts only are taken after they are welded in place. This requires that the bulk of the metal on the stepped surfaces fitting the bearing caps, and on the internal periphery fitting the main bearings for the crankshaft, be removed to rather close limits in relation to the locat-

ing points for welding. In other words, these operations are much better work than ordinary "roughing out".

Large size of these parts, their peculiar shape and nature and extent of broaching cuts involved, all are clearly indicated by Fig. 1, showing one of these saddle forgings after the preliminary machining. Forgings are approximately 25 inches long, 13 $\frac{3}{4}$ inches wide and 4 inches thick. They are of course so heavy that materials handling equipment is required to get them in and out of the machine and to shift them from one holding fixture to the other. As the illustrations indicate, the workholding fixtures are of rugged construction. Nevertheless they can be loaded and unloaded quickly—considering weight and size of work.

Aside from its size and power—it is believed to be the largest broaching machine ever built—this "72-40" duplex essentially is of standard design and readily can be retooled for other work on which its capacity will be advantageous. Its tooling—especially that of the right-hand ram—is far out of the ordinary however—introducing as it does the divided cut, indexing principle into the field of surface broaching.

Tooling of the left-hand ram,

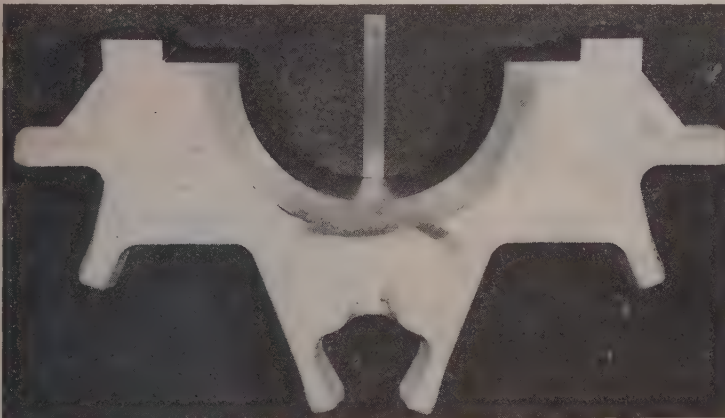


Fig. 1 (top) — Heavy forged steel bearing saddle, one of set welded into crankcases of Alco railroad diesel engines, showing bearing cap and semicircular bore for crankshaft main bearing as broached on American duplex type vertical hydraulic machine

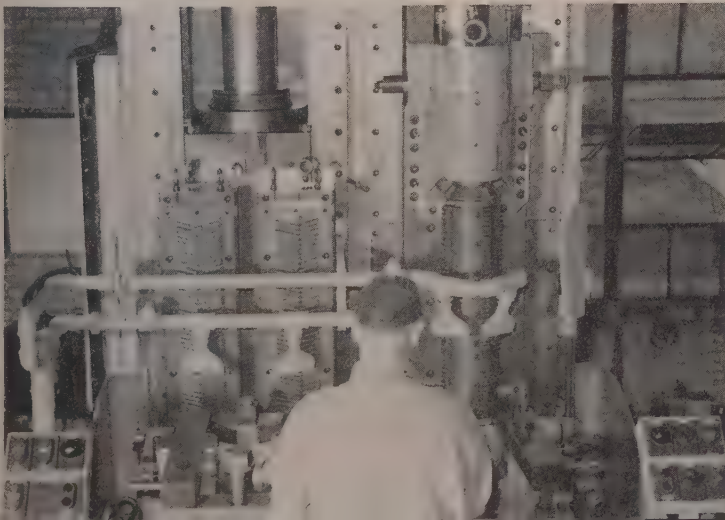


Fig. 2 (bottom)—Broaches at halfway point of one of six stages in automatic cycle. Ram at left is on upward (noncutting) traverse. Other one is on downward (cutting) stroke. Indexing cam to right of operator's head, is tilted to clear roller on indexing rod

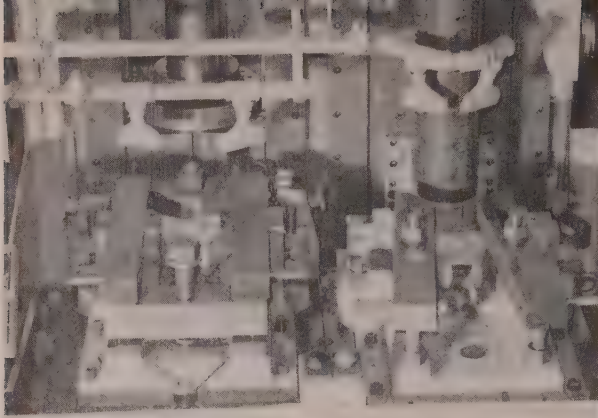


Fig. 3 (left)—Flat broaches (left) have just completed a cutting pass. Radial broach (right), having indexed, is about to take another "bite" from the semicircular bearing seat. Indexing cam, now in operating position, is about to tilt "into the clear"

Fig. 4 (right)—Base of machine, about two-thirds of which lies below floor line when mounted in pit in user's plant. This photograph shows arrangement of chain conveyor which removes chips from sump, drains them and discharges them through spout above floor line

which takes care of the stepped surfaces fitting the bearing cap, consists of two sets of "down cutting" stepped broaches which have the appearance of herringbone racks. These work on both plane surfaces of both sides of the saddle forging simultaneously. The herringbone design balances pressure on the work and gives clean "shearing" cuts.

Tooling of the right-hand ram, which machines the semicircular surface for the bearing, has as its distinctive feature a set of four sectional broaches mounted 90 degrees apart in slots in a 7 $\frac{1}{2}$ -inch steel bar.

The assembly resembles a giant size spline broach with blades 1 $\frac{1}{4}$ inches wide.

This broaching bar is supported top and bottom in massive trunnions mounted on the ram of the machine and is further supported between these trunnions by blocks on the slide whose semicircular bearings ride on the bar between sections of the blades—thus keeping the bar from flexing under pressure of cutting.

In the upper trunnion is an indexing and locking mechanism which rotates the bar 60 degrees at each upward, noncutting traverse of the ram.

This is accomplished by a flat cam hinged to the right way of the ram. The hinge rod is acted upon by the lower end of the ram to swing this cam into operating position at the start of the upstroke and to swing it aside at the start of the down (cutting) stroke of the ram.

The machine itself is set for a six-stroke automatic cycle, thus dividing the stepped surface broaching at the left into six relatively easy cuts. The operation at the right—which is the determining factor as far as time is concerned—times the movements of the work slide with the six indexes of the four blades broach bar in such a way that the semicircular cut is divided between at least two, and at times three of the four blades. The cut of one slightly overlaps the cut of the blade ahead, thus resulting in a smooth job which has the appearance of one

(Please turn to Page 126)

How To Select MATERIALS for PLASTIC MOLDS

From the wide variety of steels, cast iron and beryllium copper available for plastic mold cavities, selection is a matter of economics. In this discussion, the author sets up some criteria for judging materials and reviews current practice among mold-makers

SO many different steels are used for plastic mold cavities, it is little wonder the newcomer to moldmaking finds himself confused. Each molder or moldmaker has his own preference with which he is familiar. He knows how it machines and polishes, and how it responds to heat treatment. Any deviation from it is a venture into the unknown with a possible risk of considerable loss and a questionable gain. Thus we turned to the steel manufacturers for an answer.

In 1945 a survey covering 85 tool steel makers and warehouses was made to find what steel they recommended for plastic molds (cavities only). Sixty-eight answers were received. Of these only three indicated they made a steel specifically designed for molds. The balance either had nothing to offer or suggested steels developed for some other industry. It is obvious from this that steelmakers, as a whole, were not too well informed as to the problems of molders and diemakers,

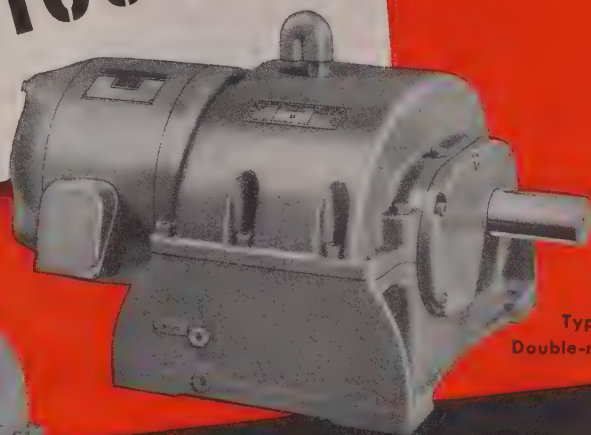
By L. J. MORRISON
Detroit Mold Engineering Co.
Detroit

and the consumer had to rely largely on his own experience and judgment.

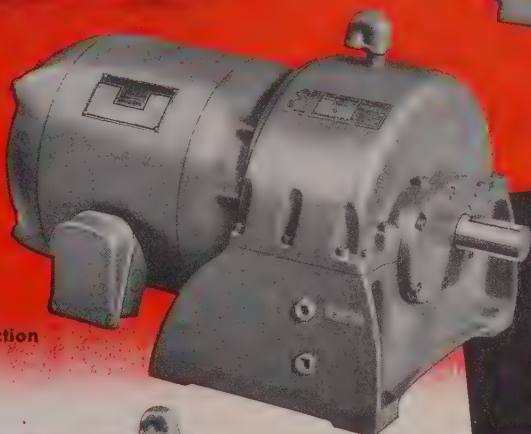
Criteria for Judging Steel—Preliminary reports from a similar survey now in progress seem to indicate that the metallurgy departments of most tool steel houses have been working overtime to rectify this condition. However, before examining recent developments, we should set up some criteria by which to judge steel and review what has been common practice.

From the standpoint of mold manufacture, steel should be free machining for machined cavities and hob easily under low tonnage for hobbled cavities. Both types should polish to a high finish and suffer minimum distortion when hardened. In any case the steel must be clean

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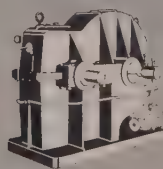
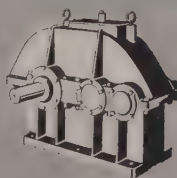
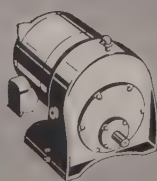
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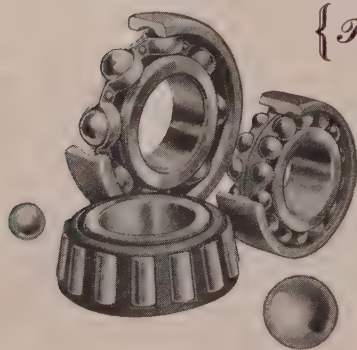


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free from impurities such as sulphides, segregation, or porosity.

From the molder's standpoint, the steel should have high surface hardness after hardening and plenty of strength in the core. High tensile strength may be paramount in some sections.

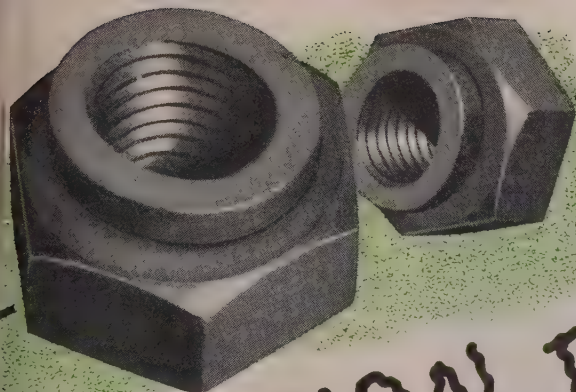
Machine steel (SAE 1020) was one of the earliest cavity materials. It was universally obtainable, cheap and easy to machine, and so found widespread use. However, for cavity use, it has largely been supplanted by alloy steels because of its many faults. Relatively speaking it is not strong and must be carburized in order to be hardened appreciably. The case thus formed is satisfactory but the core is not affected by the heat treating and remains soft. It is a steel made by the open hearth process and is usually not so clean as a closely-controlled tool steel made in an electric furnace. It will take a polish sufficiently good for many jobs, but not so good as the alloy steels. Distortion in heat treating is a maximum in this steel.

Alloy Carburizing Steels—Alloy carburizing steels represent 60 to 70 per cent of the tonnage used in plastic molds. Many different analyses fall into this category. For example: SAE 4615, SAE 3120, SAE 3312 or SAE 4130 all have the common fault characteristic of carburizing and of dimensional change in hardening, but careful heat treating can minimize this.

SAE 4615 is one of a group of molybdenum steels. Nickel is present to the extent of 1.65 to 2.00 per cent, and molybdenum from 0.20 to 0.30 per cent. These alloys serve not only to toughen the steel, but also to improve the carburizing properties, as they increase the rate of carbon pick-up at the surface. A core hardness of 280 brinell can be expected after heat treatment. In the annealed condition machining and benching properties are excellent. This steel is made both by open hearth and by electric furnace processes, but the electric furnace type is to be preferred.

SAE 3120 is a typical chromium-nickel mold steel. The addition of the chromium improves hardenability and polishing properties. Core strength will go as high as 130,000 pounds per square inch. It is not so easy to machine as SAE 4615 but it is not classified as a really difficult machining steel.

In SAE 3312, the nickel content is raised to 3.5 per cent and chromium to 1.5 per cent. The steel can be hardened in air after carburizing, and therefore distortion due to heat



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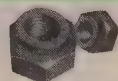
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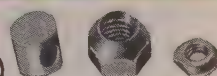
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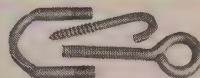
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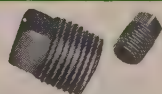
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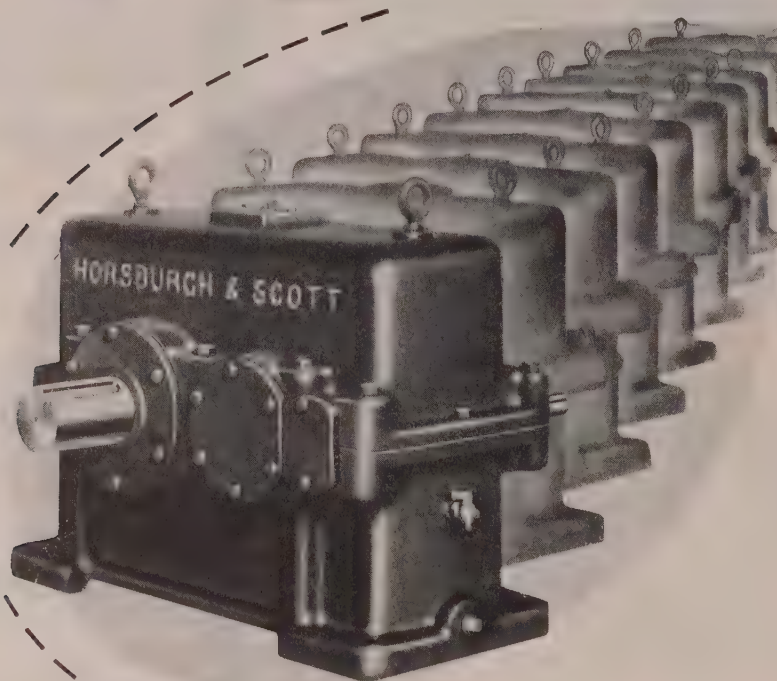
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1. Simplicity of design lowers the cost of manufacture and assembly.
2. Rugged construction, finest materials and precision manufacture, minimize maintenance.

These features are your guarantee of better built speed reducers that are economical in first cost and throughout their long life.

treatment can be minimized. Core properties are excellent—160,000 pounds per square inch tensile strength and 360 brinell hardness. Machining and benching, of course, are considerably more difficult than on the steels previously mentioned. All air-hardening steels have the further disadvantage of requiring careful annealing after welding in case of repair. Even the heat generated by a dull cutter will sometimes cause local hardening that will be very troublesome.

Steels of the SAE 4130 type (chromium-molybdenum) are very popular as carburizing mold steels. The carbon content is high (0.30 per cent) compared to most carburizing mold steels; chromium is 0.65 per cent, and molybdenum is 0.20 per cent. While tensile strength and hardness are high, toughness and dimensional stability are not so good as the SAE 3312 type.

Water-hardening steels are seldom, if ever, used for cavities. The drastic quench necessary in heat treatment makes the steel too susceptible to cracking, and distortion is at a maximum. It would indeed be very risky to make a complicated section out of a water-hardening steel.

Variety of Oil-Hardening Steels—A great variety of oil-hardening steels is used. It is not practical to discuss here all the steels recommended, for nearly every mold and mold maker has his own idea of the best. Also, there are on the market more oil-hardening analyses than any other type. As previously pointed out, one of the main reasons for the divergence of opinion on steels is that it is frequently a tricky heat treating proposition to get optimum physical properties out of a given type of steel. A heat treater may be able to get better results from a steel that has lower potentialities than another simply because he is familiar with that steel. The mold maker is loath to take a chance on something better when he has several thousand dollars tied up in labor in that piece of steel, if he is sure of satisfactory results with a steel he knows.

Steels similar to SAE 1090, but with higher manganese content, have been used on small and medium-sized cavities with varying success. However, alloy types have been used more widely because of improved toughness and better finish. SAE 6150, a chrome-vanadium steel, is very popular. Carbon content is not high, (0.50 per cent), and the chrome content is 1.00 per cent which makes a very tough steel. The vanadium content (0.18 per cent) makes for fine grain. Finishing qualities are good. With

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THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

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A **5** MINUTE
JOB

WHEN IT'S DONE ON A

P&J 5DE

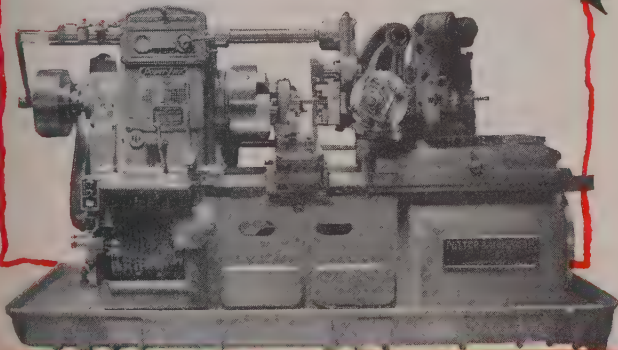
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P&J TOOLING

The finest Automatic Turret Lathe built — one like the Potter & Johnston 5DE, for example — is no better for a given job than the tooling that's applied to that job.

Potter & Johnston Tooling Engineers have the experience and the ingenuity to work out the one best combination and sequence of machining operations for high speed, high precision, low cost parts production.

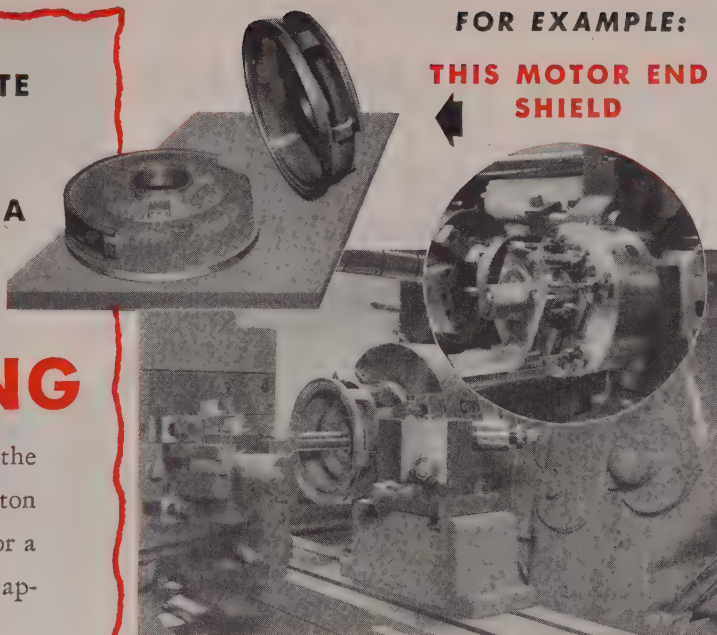
It will pay you to send parts or prints to P&J for recommendations and estimates. Seeing what we can do puts you under no obligation and may point the way to production gains and savings of substantial importance.



**5DE AUTOMATIC
TURRET LATHE**

FOR EXAMPLE:

**THIS MOTOR END
SHIELD**



**P&J TOOLED FOR THESE
SUCCESSIVE OPERATIONS:**

Closed side to spindle . . . gripped by 3 jaw chuck.

1st T.F.: Rough bore hole; rough turn O.D.; rough bore two dias.; machine dovetail groove in O.D.

2nd T.F.: Straddle face small hub; rough face bottom of counterbore; rough face end.

3rd T.F.: Finish bore hole; finish turn O.D.; finish bore counterbore; chamfer.

4th T.F.: Finish straddle face small hub; finish face bottom of counterbore; finish face end.

5th T.F.: Drill 6 small holes.

Inset pictures the P&J multiple drilling setup on 5th T.F., an exclusive P&J feature that saves a lot of time and trouble.

All done in 5 minutes on this P&J 5DE Automatic Turret Lathe: a powerful, rigid production unit with 20 changes of speed, arranged in five sets of four automatic changes; 24 feeds arranged in geometric progression; automatic binding of turret following index; direct cross slide action and constant high speed traverse motion to cross slide and turret slide. Write for Bulletin giving complete specifications.

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Johnston Company**

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Division Niles-Bement-Pond Company



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have given us **TOP PERFORMANCE**
at all times, with **LOW COST**
and **EASY MAINTENANCE**"

Cleveland Frog &
Crossing Co.



Wherever possible, material is handled on skids. Trucks are rated at 6000 lbs.—but when overloading is unavoidable, the trucks can take it.

For lifting, positioning and carrying heavy, bulky loads inside and in the yard, the Baker Crane Truck is used. It also handles dies, and moves machines up to half a ton in weight.



Long steel rails, too long for skids, are handled on a trailer coupled to the Baker Low-Lift Truck.



Six Baker Trucks keep materials on the move at this busy Cleveland plant. Some of them have been in use for 20 years—and are still handling heavy loads of railroad track switches, crossings, and other track materials, giving the same trouble-free, low-cost, quiet and dependable service as those purchased more recently.

"Before we installed our electric trucks," says Mr. Von Benken, electric maintenance engineer, "we employed about 70 hand truckers—but the trucks enabled us to transfer them to productive work. One electric truck is now doing the work of 12 men with hand trucks."

The trucks are required for constant service during the 8-hour day—lubrication, battery charging, and the occasional maintenance needed being done when the plant is idle.

"It would be difficult to imagine how we could run our plant without such sturdy material handling equipment," adds Mr. Von Benken. "We depend on these trucks."

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an oil quench the steel hardens to about 50 rockwell C, which is considered low by many molders. Machinability, benching and finish are all good. Stability in heat treatment is above average and it is known as a safe steel for use in large cavities.

A general purpose oil-hardening steel made by many companies is of the following type: Carbon 0.90 per cent, manganese 1.25 per cent, chromium 0.50 per cent, tungsten 0.50 per cent. Due to increased carbon, it is somewhat more difficult to machine than SAE 6150, but still has good machinability. It hardens to 60 rockwell C with an oil quench and is a good strong steel. Heat treatment of large uneven sections is likely to be risky.

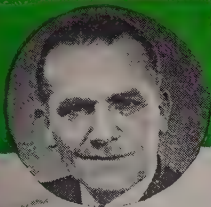
Physical properties of some air-hardening steels are probably the best of all for cavity work. They will have maximum core strength and toughness and also a surface hardness up to 58 rockwell C. Polish attainable is second only to stainless steel. Distortion in heat treatment is at a minimum for there is no size change due to absorption of carbon as in carburizing, or change due to drastic quench. They are known as "hot work" die steels and are characterized by a medium carbon content, about 0.35 to 0.45 per cent, 4.0 to 5.0 per cent chromium and varying smaller percentages of molybdenum, silicon, vanadium and tungsten. On the other side of the ledger, the hot work steels are among the toughest to machine and bench. Compared to the steels already mentioned, the cost per pound is also quite high.

For cavities for injection molds it is questionable if steel of this quality is necessary, but for cavities and punches for compression molds, often the best is none too good. Long cores and cavity sections subject to high transverse strains are best made of hot work steel.

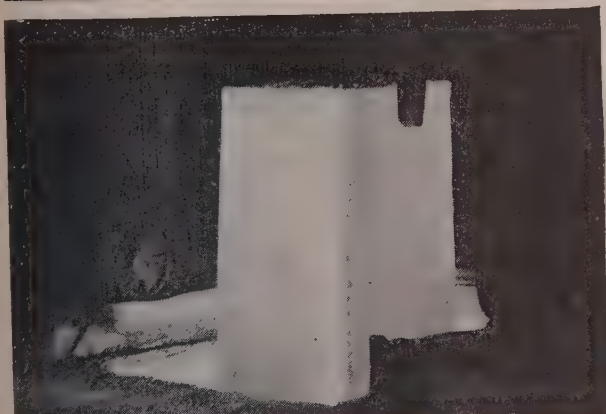
High carbon, high chromium air-hardening steels are seldom seen in cavities but find utility in hobs where their high compressive strength is of advantage. They do not have the toughness and resistance to transverse strain shown by the hot work steels.

Stainless for High Polish—When it is necessary to have the best polish possible, as in molds for lenses or fine jewelry, stainless steel is indicated. For this work an analysis of 0.30 per cent carbon and 13 per cent chromium is widely used. It is considered quite difficult to machine and polish. Free machining grades are made by the addition of sulphur, but the high sulphur makes a "dirty" steel which will not polish to the

Baker INDUSTRIAL TRUCKS



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"CORRECT FURNACE ATMOSPHERES so vital to steel production presented a baffling problem to us when we tried to control them scientifically. So we tried the Cities Service Heat Prover. Results were immediate. We got less scrap, less scaling plus more and higher quality production. Savings in fuel and time were also substantial."

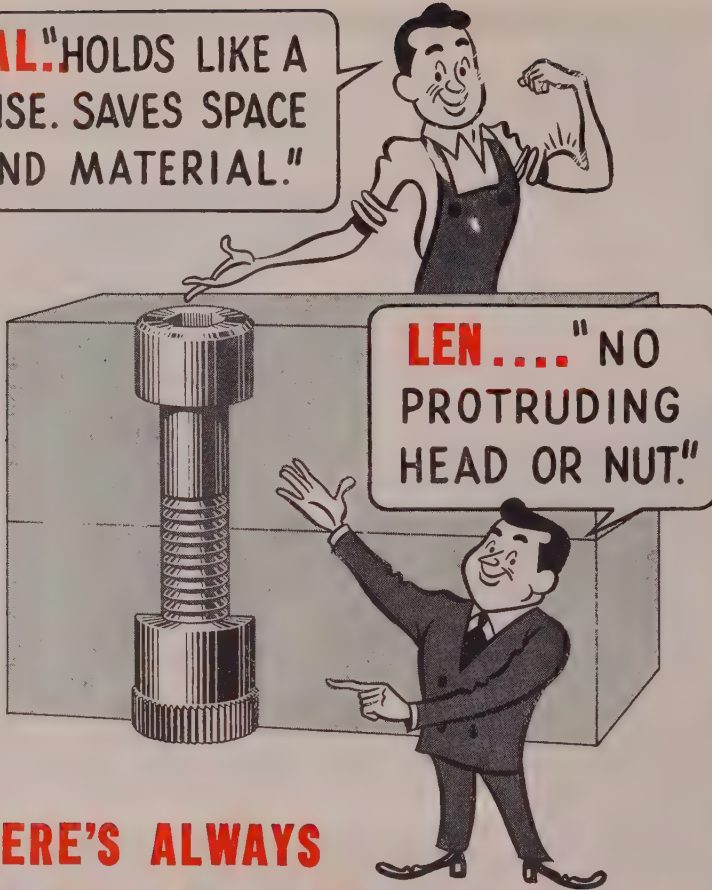


CITIES SERVICE HEAT PROVER quickly analyzes combustion atmospheres of industrial furnaces regardless of type or size. It tells exactly how much fuel is wasted—how much energy is wasted in uselessly heating excess air or whether excess oxygen is present to cause scaling as in the heat treating of steel. Write for a free demonstration today.

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AND MATERIAL."



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The Allenut* is the precision counterpart of Allen Hex-Socket Cap screws. A "ready-made" threaded hole, one end tapped to a Class 3 fit, the opposite end with a double hex socket for wrenching. Greater holding power, easier assembly, more compact design, all

are made possible by the new Allenut*, now available from No. 4 to 1", NC or NF threads. Here's another instance to prove that the Allen dealer is the man to see first for the answer to a precision fastening problem. For technical information, write the factory direct.

Popular sizes of Allen Hex-Socket Set Screws and socket head cap screws now standard and available in stainless steel from distributors' stock. New methods, new alloys, new designs are constantly being investigated, and the best put to use to make every Allen socket screw, dowel pin and pipe plug the best money can buy.

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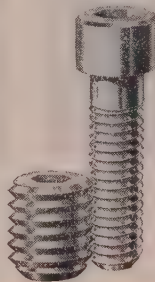


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perfection usually required of stainless.

Cavities made by the hobbing process present even more problems to the steelmaker. In order to make steel as plastic as possible for best hobbing conditions, the carbon content is lowered and all alloys are removed. Resulting cavity can be hardened only by carburizing. As with SAE 1020, surface conditions are good, but the core remains dead soft—a highly undesirable state. Steels other than the plain low carbon variety can be and are hobbed, but only at the expense of additional hobbing pressures, which makes for much more difficult hobbing.

SAE 3110 is typical of the alloy hobbing steels, having an approximate analysis of 0.10 per cent carbon, 0.50 per cent manganese, 0.60 per cent chromium and 1.25 per cent nickel. Core strength is about two to three times as good as plain carbon hobbing steel, and the machinability is about the same as plain carbon, i.e. not good.

For master hobs two types of steel are very popular. Tungsten chisel steel is probably the more widely used and has an approximate analysis as follows: Carbon 0.50 per cent, manganese 0.20 per cent, silicon 0.75 per cent, chromium 1.20 per cent, tungsten 2.50 per cent, and vanadium 0.25 per cent. Pack hardening in charcoal followed by an oil quench gives a very hard skin (61-63 rockwell C) and a very tough core. One of the main reasons for hob breakage is transverse strains due to irregularities of shape. This steel is especially resistant to transverse strains.

High carbon-high chromium steels are also used for hobs because of their extremely high compressive strength and ability to hold dimension during heat treatment. Any transverse strains are likely to be fatal to this steel, but it will resist crushing that would squash the chisel steel.

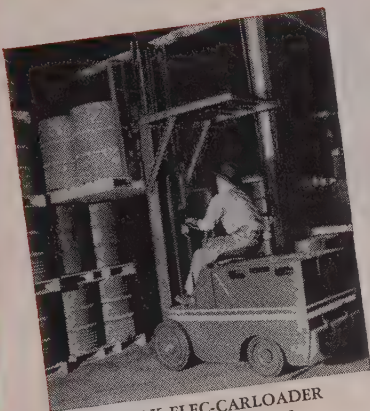
Hobbing Steels—Recent developments in mold steels have been principally along the lines of hobbing steels, with a strenuous effort to improve machinability, raise core strength, and improve dimensional stability during heat treating. One company has been trying a graphitic steel that will harden in oil. A second has a 0.90 per cent carbon steel that will give a deep case and a hard core in carburizing. Tests prove that both steels can be hobbed, but the tonnage required is somewhat in excess of that required by SAE 3110. Additional research may perfect both.

Several companies make air-

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Time Savers, Cost Cutters

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CLARK FORK LIFT TRUCK

Handle materials the modern way . . . the fast, safe, economical way. Use versatile battery electric trucks for loading, unloading, hauling, high tiering. They'll help you speed production, open up bottlenecks, save and earn for you all along the line. When powered by dependable Exide-Ironclad Batteries, you can count on full shift availability day after day, year after year.

Different from all other batteries in construction as well as in performance, the Exide-Ironclad possesses ALL FOUR of the essential characteristics demanded of a battery for electric industrial truck service—(1) high power ability, (2) high efficiency, (3) great ruggedness, and (4) long life. These characteristics are due to the special construction of the Exide-Ironclad Battery, especially its rugged, tubular positive plate.

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Performance
Report on the
AXIAL FACE
KENNAMILL**



Comparative Results	Competitive Cutter (Carbide Tipped Blades)	Axial Face Kennamill (Solid Kennametal Blades)
Number castings milled per 8 hour shift	140	140
Number blades per pair of cutters	48	52
Cost per blade	\$1.20 (est)	\$4.20
Cost, two complete cutters	\$312.00	\$660.00
Number regrinds per blade	22	250
Number castings milled per grind	140	280
Number hours between grinds	8	16*
Blade cost per 8 hour shift	\$2.618	\$4.37
Blade cost per casting milled	\$0.1870	\$0.0312
Time to grind cutter	90 min.	45 min.
Hourly grinding cost (est)	\$4.00	\$4.00
Grinding cost per 8 hour shift or per 140 castings	\$6.00	\$1.50*
Grinding cost per casting milled	\$0.0428	\$0.0107
Total blade and grinding cost		
Per 8 hour shift	\$8.61	\$1.937
Per casting milled	\$0.0615	\$0.138
Per year (2 shifts, 5 days, 50 weeks)	\$4,305.00	\$968.50
*Reground once every other shift		
Annual savings \$3,336.50		
at an increased first cost of \$348.00		

Long Life and Extremely Low Maintenance Are Cost-Saving Advantages of Solid Blade Axial Face Kennamill

The operation detailed in the table is a production job—where tooling costs are an important factor. It comprises straddle milling the top and bottom surfaces of cast iron cylinder heads.

Use of the Axial Face Kennamill reduced milling costs on this job 80%. And—this saving was made even though the competitive cutter was carbide-tipped, and performed exceptionally well.

The Axial Face Kennamill has extremely abrasion-resistant solid Kennametal blades, securely held in position by wedge construction, which prevents thermal strains and permits the high strength of Kennametal to be utilized. These blades can be sharpened at minimum expense in a standard tool and cutter grinder. No steel has to be ground. Only two readily-accessible blade surfaces need sharpening.

In the typical report shown above these facts stand out:

- Solid Kennametal blades last twice as long between regrinds
- More than 10 times as many regrinds can be made per blade
- Only one-half as much time is required to sharpen the cutter

Ask our representative to show you what solid blade Axial Face Kennamills can do on your cast iron milling jobs.



Another Axial Face Kennamill job: Roughing and finishing in one pass—627 pieces milled before cutter required sharpening.



KENNAMETAL Inc., LATROBE, PA.

Write for Catalog 48. It describes Kennamills for most face-milling operations



hardening hobbing steels. The analyses of all four are quite similar, approximating 0.10 per cent carbon, 0.37 per cent manganese, 5.0 per cent chromium, 1.00 per cent molybdenum and 0.35 per cent vanadium. Although the steel has been on the market only a short time, preliminary results indicate that those criteria previously mentioned are satisfied. The steel is more easily machined than hobbing steels, but does not work-harden as rapidly. It is hardened by carburizing and quenching in air with very low deformation. Surface hardness from such treatment is 57 rockwell C and core hardness 25 rockwell C. If the steel proves as good in use as it looks on paper, the plastics industry will then have found a truly universal mold steel.

Other Materials—Materials other than steel frequently find their way into cavities. It is sometimes economical to make a large cavity of cast iron in order to try out a method of molding. Ordinary castings, either iron or steel, can hardly be considered suitable for cavities due to the possibility of flaws, holes or cracks on the cavity surface. However, for tryout, it is possible to use castings.

Electroformed cavities — those made by plating iron on a rubber master—are occasionally useful. Extremely intricate work which is not too deep can be faithfully reproduced by this method. However, the problem of backing up the plated cavities has not been satisfactorily solved and the long period of time—usually several weeks—necessary for the plating is objectionable. Plated cavities are of use principally for injection molds. Cavities made by spraying molten alloy steel on a revolving water-cooled master have been tried, but the process is still in the experimental stage.

Beryllium copper as a cavity material has great potentialities. It will reproduce the finish of the master it is cast upon and can be hardened to 40 rockwell C. It is quite tough and does not tend to chip or crack. New alloys are being developed that will harden to 50 rockwell C. However, there is much work yet to be done on casting technique and material handling. Beryllium copper finds its main use in cavities for injection molds. It is seldom used for compression.

Selection of a particular type of material from the group enumerated now becomes a matter of economics. If the cavity can be hobbled, and there are several such cavities, then choice is restricted to hobbing steels. Here, because of their superior core

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Fastener Economy. The accuracy and
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and Lag Bolts are the products
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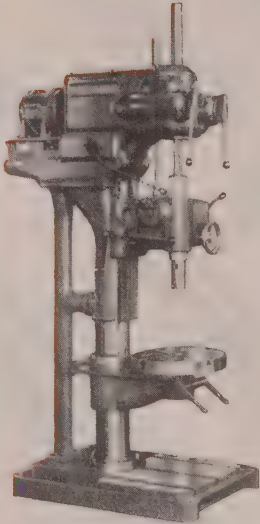


THE

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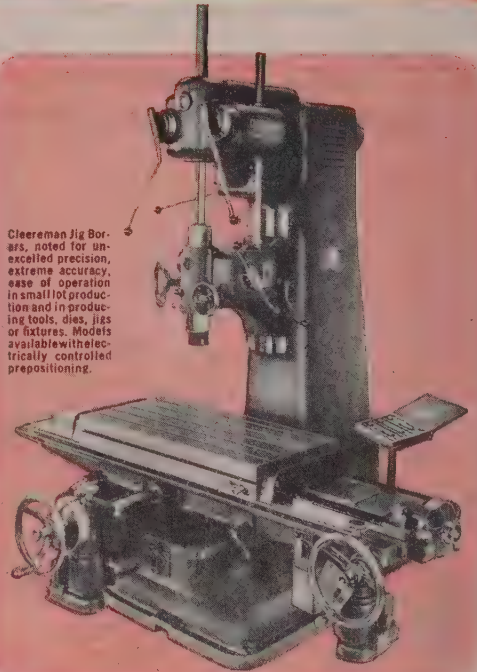
OF PRECISION JIG BORERS and DRILLING MACHINES



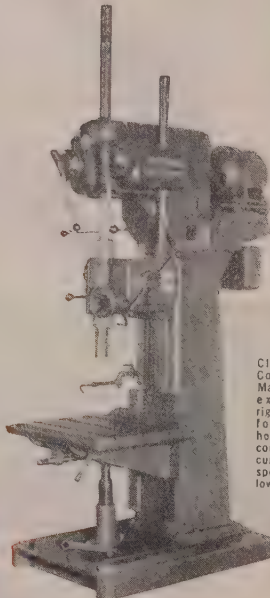
Cleereman Model 325 Single Unit Sliding Head Drilling Machines combine extreme sensitivity with rugged construction, are extremely versatile and may be used for production drilling and tapping



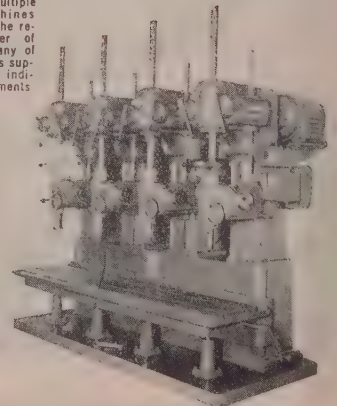
Cleereman Round Column Drilling Machines produce accurate holes at high speed and at low cost and are general purpose machines with high production



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Cleereman Multiple Drilling Machines consisting of the required number of machines of any of the three types supplied to meet individual requirements



Cleereman Box Column Drilling Machines have an exceptionally rigid construction for continuous heavy duty work combined with accuracy and the speed required for low cost production

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strength, the alloy type hobbing steels are to be recommended if the hobbing shop can handle them. Otherwise, plain carbon types must be used and there is little choice.

If production is such that the mold must be run to destruction, the best materials should be used regardless of cost or ease of machining. Molded items whose design changes yearly, can be made in cavities of less durable material. Often, on long run jobs of intricate shape, it is cheaper to use hobbled cavities or beryllium copper cavities until they are no longer serviceable. Replacement of these cavities is usually inexpensive. When extreme accuracy is of paramount importance, the air hardening or hot work types are best because of little dimensional change in heat treatment. For extremely large sections, carburizing types are favored because of less danger of cracking in heat treatment.

Steel for the balance of the mold does not present the problem found in cavities. Cleanliness and high polish are of little import and dimensional change in hardening can be allowed for and corrected by grinding. There is none of the hand work that complicates cavity manufacture.

For transfer pots and punches a hard surface and high core strength are requisite. Good oil-hardening steels or the alloy carburizing steels are commonly used. Cams for core pulls and moving parts of the mold are usually of the oil hardening grade. Machine nozzles and sprue bushings cannot be brittle and so are usually of an oil hardening or hot work steel.

Grids or risers for compression molds are made of cast steel or cast iron or sometimes are of a welded machine steel construction. Steamplates are made of machine steel or SAE 1040. The higher carbon steel is to be preferred for its higher tensile strength. Injection molds are usually built up of machine steel, but the trend is toward a toughened steel, such as heat treated SAE 1040 or SAE 6150.

From data presented by the author before the annual meeting, New England section, The Society of the Plastics Industry, Manchester, Vt., Oct. 14 and 15, 1948

More than 150 electrical measuring devices manufactured by the General Electric Meter and Instrument Divisions, West Lynn, Mass., are featured in the company's rolling "Carnival of Measurements" exhibit now on a 14,000-mile tour of 80 major industrial centers. It will be displayed some 300 times in 9 months to groups concerned with the science of measurement.

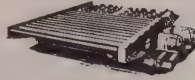
... ever sit in on a

Conveyer Post Mortem?

... they're mighty interesting, and more common than you might think. Just like other machinery that goes into heavy industry, conveyers sometimes break up under severe service. When that happens, there comes a series of shirt-sleeve sessions aimed at determining just why the job went bad. Sometimes it proves to be materials that are at fault; again, careless operators might be to blame; but much more often it develops that the equipment, for one reason or another, just wasn't designed heavy enough in the first place. But whatever they might prove—these long reviews of the details of a bad job—they are all part of the experience of seasoned conveyer people.

Most steel plant engineers find that it is pretty sound judgment to depend on conveyer people who have many years of such experience behind them—people who started years ago handling "heavy" coils which weighed 8,000 lbs., and who today are building equipment to handle those which weigh 25 tons—people who know why the good systems stayed on the job, and why the bad ones couldn't stand the gaff.

Give your heavy handling problem the attention it deserves. Take it to Mathews' Engineers, and let them go the limit in building into the job the weight required. It will pay off in long, trouble-free service.



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The crankshaft is an important, expensive part of the modern, high speed engine. It represents many hours of precise, highly skilled workmanship. Yet the crankshaft can be sabotaged in a few minutes . . . if the bearings are not exactly right. In fact, without the right fit, correct alloy and proper lubrication method, excessive wear develops or the bearings freeze to the shaft.

Johnson Bronze knows and appreciates the vital part that sleeve bearings play in any motive unit. Its speed, efficiency and economy of operation depends to a very great extent on the bearings. That is why we insist on quality and precision in every bearing we produce. And that is why so many leading manufacturers depend entirely on Johnson Bronze for all of their sleeve bearings.

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BRANCHES IN
20 INDUSTRIAL
CENTERS

Palm Oil

(Concluded from Page 88)

such as the Mattison machine, at high belt speeds. Sheets of 20 to 30-gage thickness, 15 to 48 inches wide, and 5 to 10 feet long are both rough ground and finish ground (or polished). In rough grinding, about 0.002-inch of metal is removed in several passes of the sheet under the belt. This is necessary to eliminate surface pits on the plate. The finish grinding or polishing gives a high luster to the sheet surface desirable in subsequent use in steel equipment and fixtures.

Heretofore, palm oil has been used almost exclusively in this grinding operation being heated to a liquid in large buckets, and manually applied to sheet surfaces between passes on the grinder. Normal grinding pressures are 9.5-13.5 pounds at full load of 50 to 60 amperes on the machine. Palm oil cutback with a light mineral diluent has been used for the rough grinding and palm oil neat for the finish polishing operation.

Experience with several steel plants doing this class of work has led to field development of suitable mineral-base replacements for the palm oil formerly used. This development has resulted in both improved operations and reduced costs of lubricant. Initial attempts by some plants to use simple light mixtures of mineral oil and fatty oils as a replacement lubricant resulted in excessive build-up of sheet temperatures during grinding, excessive smoking of the oil, and poor grinding results.

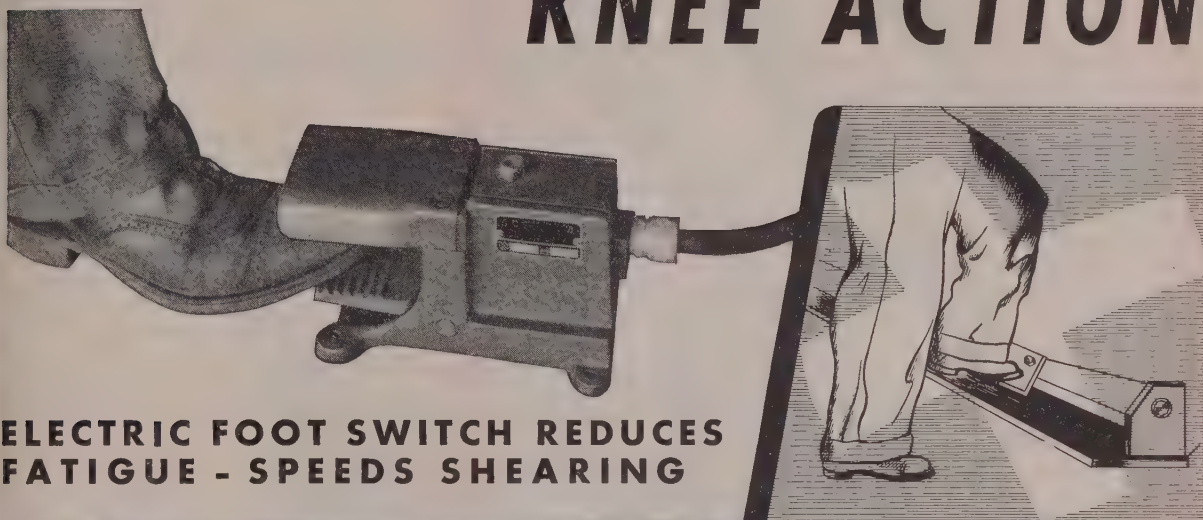
Approach on this problem was to formulate a series of products varying in both saponifiable content and type, and also free acid content. Trials of several of these experimental oils led to observations permitting selection of an optimum formulation. The final product then developed was put in production use on both rough and polish grinding with excellent results and, as stated, a substantial saving in oil cost.

With the new oil, surface pits were minimized, sheet temperatures during grinding reduced, and useful belt life increased. In another plant doing this work with the new oil, it was observed that 50 average size sheets (12 to 24-gage stainless) could be regularly ground with the new oil before belt failure.

REFERENCES

- (1) "Evaluating Lubricants for Cold Rolling Steel to Light Gauges"—R. J. Nekervis and R. M. Evans, Battelle Memorial Institute, Columbus, Ohio—paper presented to AISE, Pittsburgh, Pennsylvania, September 24, 1947.
- (2) *Tinplate*—W. E. Hoare and E. S. Hedges, London: Edward Arnold and Co. (1945).
- (3) *The Making, Shaping, and Treating of Steel*—Camp and Francis (Fifth Edition) Carnegie-Illinois Steel Corp. (1941).

TOE CONTROL ELIMINATES KNEE ACTION



**ELECTRIC FOOT SWITCH REDUCES
FATIGUE - SPEEDS SHEARING**



● The operator can slide the switch around the floor to wherever handiest to use. A mere touch of the toe and the knife is set in motion. Electric toe control is standard on all Steelweld Shears and furnished at no extra cost. It enables shearing speeds not attainable with ordinary foot treadles for many cutting operations.

● If you have spent a day at a shear with the old mechanical foot treadle, you know what knee action is. As the hours roll by it grows more and more tiresome, fatiguing, and production slips accordingly.

At last something has been done about it. Electric foot switches have been adopted as standard equip-

ment for Steelweld Shears. Knee action has been replaced by fast easy toe control.

Toe control is one of many outstanding features you get on Steelweld Shears. These machines are in a class by themselves. Learn what they can do for you.

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.
7814 EAST 282ND ST. WICKLIFFE, OHIO



**STEELWELD PIVOTED
BLADE SHEARS**



CLEVELAND SPECIALIZATION in Cap Screws, Set Screws and Milled Studs

assures you extra accuracy, extra rigid inspection, extra fast delivery

Cleveland concentrates on making a few items well—a policy adhered to for more than 30 years. Because of this specialization, we carry what we believe is the widest range of sizes in the industry, including diameters to 1½ inches and unusual lengths. Fast production by modern facilities helps us to give you extra fast delivery of *Top Quality Products*. It pays you to specify and buy Cleveland Fasteners. The Cleveland Cap Screw Company, 2917 East 79th Street, Cleveland 4, Ohio; Warehouses, Chicago and Philadelphia.

CLEVELAND
Top Quality
FASTENERS

ORIGINATORS OF THE
KAUFMAN **DOUBLE
EXTRUSION** PROCESS

Specialists for more than 30 years in
CAP SCREWS, SET SCREWS, MILLED STUDS
Ask your jobber for Cleveland Fasteners

Surface Broaching

(Concluded from Page 110)

done by a single big semicircular broach.

Such a single broach not only would be physically and economically impractical as a tool engineering proposition, but also a broaching machine powerful enough to pull it would be a machine tool monstrosity. Hence the indexing broach is a sensible answer to the problem, typical of what happens when machine tool designers, tool engineers and production engineers sit down together around a conference table when the machining project is in the "born-ing" stage.

Standing as it does almost three times the height of a man and with its work tables beyond the reach of a tall man standing beside its base, this big broaching machine is installed in a pit at the customer's plant. This brings the working area at convenient height for an operator standing at floor level, but it introduces a problem of chip removal from the sump in the base.

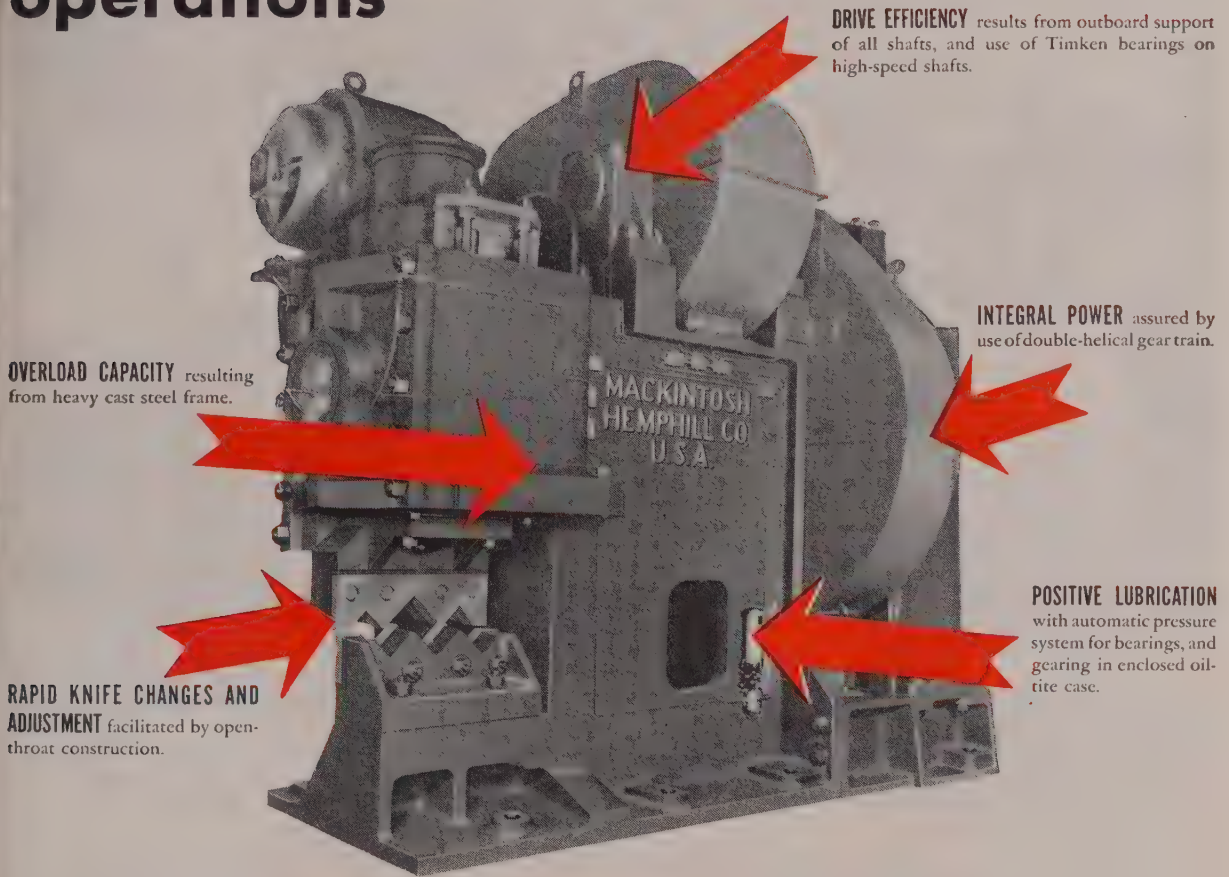
This has been solved neatly by an enclosed, inclined chain chip conveyor and drain which discharges the chips through a spout at bin height above the floor. The pit is of course big enough to allow room enough for servicing those mechanisms and details of the machine which are below floor level. In designing the machine, careful attention was given toward making close-quarters servicing of such details as simple and convenient as possible.

Power Crane and Shovel Standard Submitted

Purpose of a recommended commercial standard for power cranes and shovels submitted to producers, distributors and users for acceptance is to provide uniform methods of supplying specification data, requirements and definitions for fair competition and a better understanding between buyers and sellers of power cranes and shovels. Submitted by the Commodity Standards Division of the National Bureau of Standards, it covers sizes rated as to shovel dipper capacity of ¾ to 2½ cubic yards.

Proposed by the Power Crane & Shovel Association, the recommended standard applies to power cranes and shovels of the convertible full revolving types, crawler, truck and wheel mounted, including front end operating equipment for clamshell, dragline, lifting crane, pile driver, shovel and hoe operation. Provision is made for certifying material conforming to the recommended standard.

High-speed cut-off shears pace production in continuous forging operations



OVERLOAD CAPACITY resulting from heavy cast steel frame.

DRIVE EFFICIENCY results from outboard support of all shafts, and use of Timken bearings on high-speed shafts.

INTEGRAL POWER assured by use of double-helical gear train.

POSITIVE LUBRICATION with automatic pressure system for bearings, and gearing in enclosed oil-tite case.

RAPID KNIFE CHANGES AND ADJUSTMENT facilitated by open-throat construction.

Designed to prevent lags in the cut-off operation in modern high-speed forging practice, Mackintosh-Hemphill Shears embody the essential features for maintaining continuous production cycles.

Manufactured in six sizes, with capacities ranging from 150 to 1250 tons, Mackintosh-Hemphill Shears can be operator-regulated to conform to the cut-off requirements of automotive and industrial forge shops, and cropping and dividing operations in continuous bar and billet mills.

The high production rate and all-round flexibility of Mackintosh-Hemphill Shears result from these important advantages—

(a) Overload Capacity (b) Drive Efficiency (c) Integral Power
(d) Rapid Knife Changes and Adjustment (e) Positive Lubrication

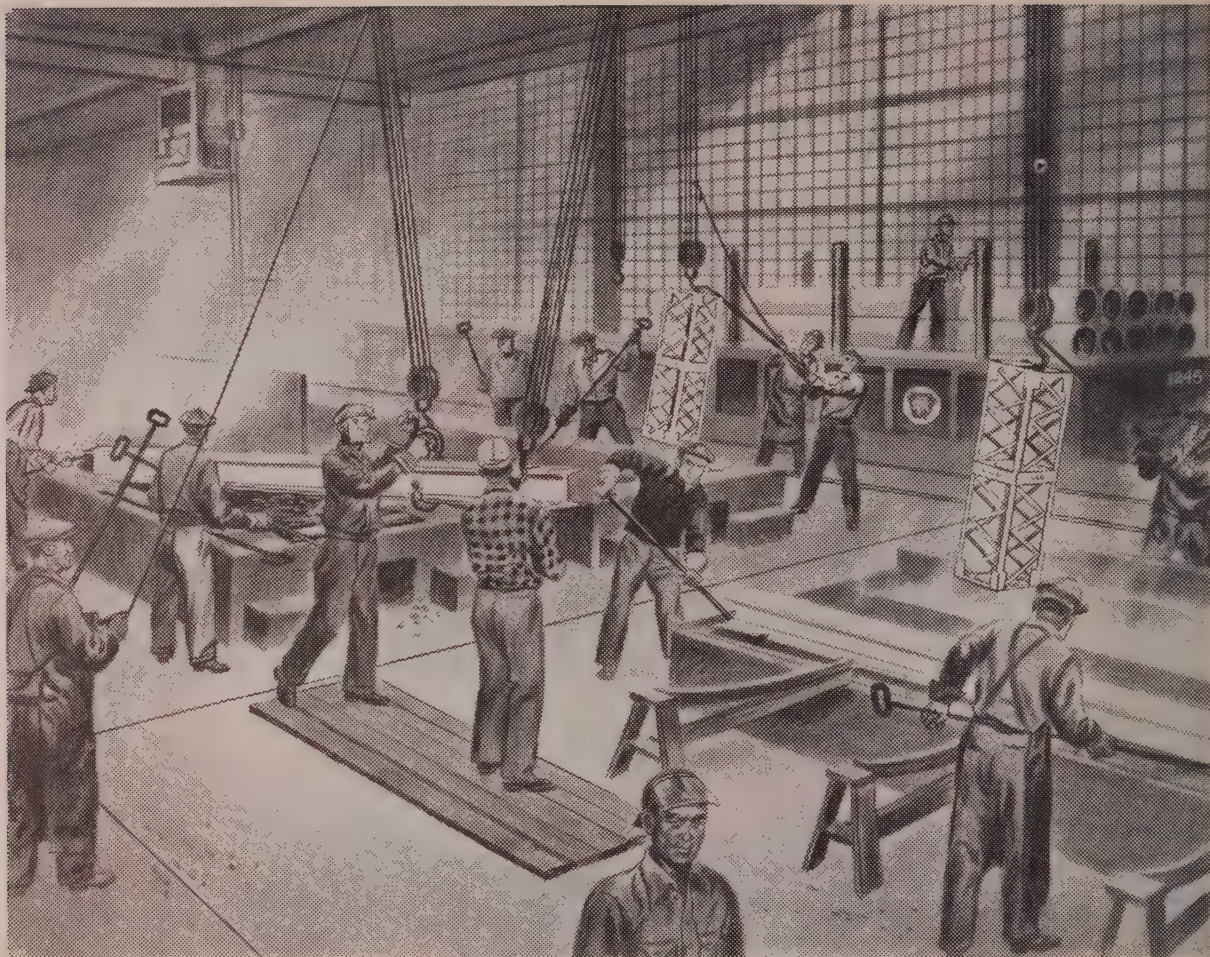
Whenever cut-off operations must be geared to high-speed forge shop or continuous bar mill practice you'll find that Mackintosh-Hemphill Shears can set the production pace.

MACKINTOSH-HEMPHILL CO.

PITTSBURGH AND MIDLAND, PA.

Makers of the Rolls with the Red Wabblers

OTHER MACKINTOSH-HEMPHILL PRODUCTS INCLUDE: ROLLS . . . STEEL AND SPECIAL ALLOY CASTINGS . . . COMPLETELY INTEGRATED STRIP MILLS . . . HEAVY DUTY ENGINE LATHES . . . THE NEW MACKINTOSH-ABRAMSEN STRAIGHTENERS . . . IMPROVED JOHNSTON PATENTED CORRUGATED CINDER POTS AND SLAG HANDLING EQUIPMENT . . . SHAPE STRAIGHTENERS . . . SHEARS . . . LEVELLERS.



Artist's sketch, made at "The World's Largest Job Galvanizing Plant", showing a section of galvanizing and cooling tanks, and a part of the interior railroad siding.

The "go" sign is given—then concerted action begins at the Hanlon-Gregory Galvanizing plant. Every galvanizing job progresses with clock-like accuracy because every job, regardless of its size, is fully planned and scheduled in advance of operations.

With the most modern galvanizing facilities, many developed in our own plant, and our team of trained employees experienced in pro-


ducing the highest standard of quality galvanizing—Hanlon-Gregory has earned a reputation for both excellence and expediency.

• • •

One of our plant representatives will be glad to discuss, at any time, the numerous advantages of our facilities and our location to you.


THE WORLD'S LARGEST JOB GALVANIZING PLANT

**In the heart of the
STEEL INDUSTRY**



HANLON - GREGORY

GALVANIZING COMPANY



Pittsburgh,
Pennsylvania

GALVANIZING... PICKLING... and OILING

/STEEL

New Products and Equipment

Grinding Machine

Featuring adaptability for the use of two different quality grit belts at the same time, the type H grinding, polishing and deburring machine being manufactured by Delta Mfg. Div., Rockwell Mfg. Co., 600 East Vienna Ave., Milwaukee 1, Wis., is offered in four different models. All basic models of the machine, which may be converted into a buffing machine, consist of the arbor head, an idler unit, a straight-faced contact roll and abrasive belts. The arbor head is constructed of fine grained gray iron casting. The ground $\frac{5}{8}$ -inch arbor shaft runs in preloaded, double-sealed, lubricated-for-life ball bearings.

Extending $3\frac{1}{2}$ inches out from the inner flange at each end, the arbor

driven into a pile of loose material without the use of hydraulic cylinders.

When handling abrasive materials, edging and wear strips are provided on the bottom of the scoop. It can self-load 100 per cent capacity in loose materials and as much as 60 per cent in clay of high moisture content. Loads are released at any

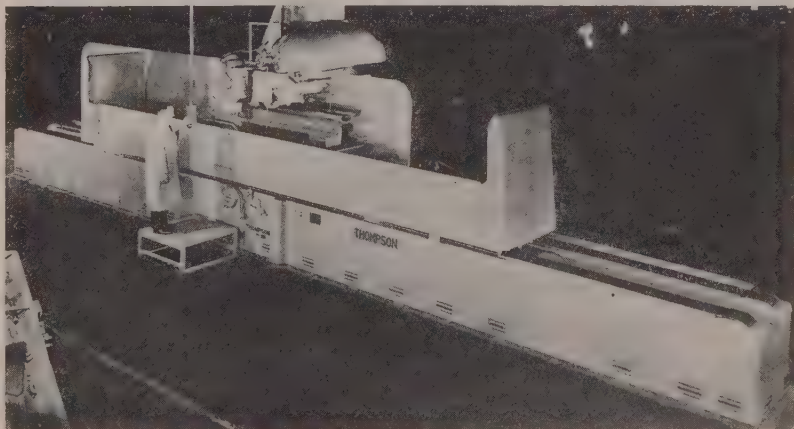


predetermined height by a fixed trigger or at any height within the lifting range of the truck by a manually operated lever. Scoop is mounted on a standard carriage plate and is easily interchangeable with standard forks.

Check No. 2 on Reply Card for more Details

Grinding Machine

Horizontal spindle working capacity is 240 inches on the new way grinding machine manufactured by Thompson Grinder Co., Springfield, O. Known as the heavy duty type CX 30 x 48 x 196-inch hydraulic way grinder, it has a 46 foot bed length. The machine is equipped with auxiliary vertical spindle for grinding safety gib, clamp surfaces and rack seats on the machine bed. Heavy rib construction throughout the base provides a rigid foundation free from



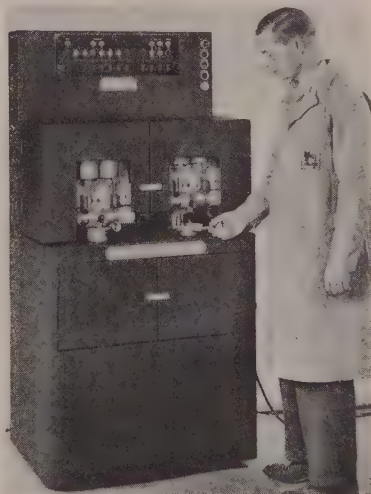
distortion and assures permanent accuracy.

High powered super precision wheel head and slide unit is mounted on a single massive column with large rectangular ways. Two levers control entire hydraulic movement of the table and wheel head unit. Antifriction elevating nut permits accurate feeding of the wheel head of 0.0001-inch. Table speeds are variable between 10 and 100 feet per minute. Wheel head unit is mounted with a 30-horsepower motor.

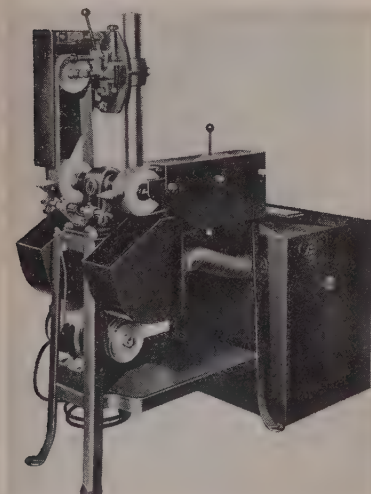
Check No. 3 on Reply Card for more Details

Gaging Machine

Two identical mechanisms for gaging, classifying and stamping of refrigerating unit muffle boxes are incorporated in the automatic Airlec-



tric gaging and classifying machine, developed by Sheffield Corp., Dayton 1, O. One spindle is loaded and unloaded by the operator while the



shaft has a $2\frac{1}{2}$ inch acme thread at the ends to take contact rolls from $\frac{7}{8}$ -inch to $2\frac{7}{8}$ inches wide. The idler unit has an adjustable belt tension hand release, belt tracking adjustment and adjustable pulley position. Aluminum oxide belts in four different grits are available for general purpose use on steel, brass, forgings, die castings and some plastic materials.

Check No. 1 on Reply Card for more Details

Fork Truck Scoop

Electric industrial fork trucks equipped with pneumatic tires and an automatic self-loading scoop in capacities up to 15 cubic feet are being manufactured by Crescent Truck Co., Lebanon, Pa. Installed on 3000 and 4000 pounds trucks, the scoop loads itself automatically when

other mechanism is going through the gaging cycle. Maximum rate of operation permits the checking of 1500 parts per hour.

Average diameter of the counterbore is checked with a multiple orifice solid tungsten carbide spindle connected with a series of Airlectric gaging heads and its classification, one of three of 0.0003-inch tolerance each, is retained by a "memory" device. At the same time the depth of the counterbore is checked and its classification set up, one of seven of 0.0003-inch each. The final classi-

fication, one of 21 of the same size, is then automatically stamped on the muffle box by means of air operated metal die stamping mechanisms. Lights indicate which dimension is out of tolerance, should this be the case.

Check No. 4 on Reply Card for more Details

Multiple Station Gage

Multiple station piston gage, announced by Pratt & Whitney Division of Niles-Bement-Pond Co., West Hartford, Conn., checks six dimensions simultaneously, stamps two

grades, and automatically shows the number of pistons of each grade inspected. The gages use Pratt & Whitney Electrolimit and multiple electric contact gaging medium. By look-



ing at the instrument panel, the inspector has the complete information on each piston.

At the same time, the piston is automatically marked on top with the grades of the skirt diameter and the pinhole diameter. Dimensions are indicated on meters and by lights. Counters at the bottom show the total of each grade of skirt diameter which has been gaged.

Check No. 5 on Reply Card for more Details

Steam Gun

An addition to the line of steam-cleaning equipment made by Oakite Products Inc., 134E Thames St., New York 6, N. Y., is the solution-lifting steam gun, model 481, designed for



volume cleaning operations in industrial plants. The gun, measuring 5 feet long over-all, is so balanced that it may be used over extended periods without tiring the operator. Two insulated handles are provided on the gun, one remaining stationary, the other being rotated by the operator when cleaning underneath and hard-to-reach surfaces.

Steam and solution hoses are connected to the gun by swivel joints. A reinforced rubber apron backs up the steam valve and other hot fittings to protect the operator from

Here's Proof of Performance!

Comparison of Costs of Lining Soaking Pits In A Well-Known Steel Mill

Explanation—Convinced that the most accurate method of comparing the relative costs and performance of Buckeye Silica Firestone with another material used for many years, a test under identical operating conditions was conducted by a well-known steel plant with the following results:

	Buckeye Silica Firestone	Other Material
Maintenance cost per ton of ingots heated	.0005	.0033
Installation cost per ton of ingots heated	.0069	.0089
Total cost, Maintenance and installation	.0074	.0122
Approximate life of soaking pit linings	4½ yrs.	2 yrs.
Increased cost of other material over stone		64.8%
Average annual maintenance cost, ratio of stone to other material: 1 to 6.		

You, Too Can Enjoy Buckeye Efficiency and Economy

Buckeye's record in hundreds of other steel plants indicates what it can do for you. A Buckeye service engineer will gladly point out its many advantages and discuss its application to your particular problem. Write!

THE CLEVELAND QUARRIES COMPANY

1740 E. Twelfth St.

Cleveland 14, Ohio



* Full explanation of Buckeye is found in Bulletin 15-B

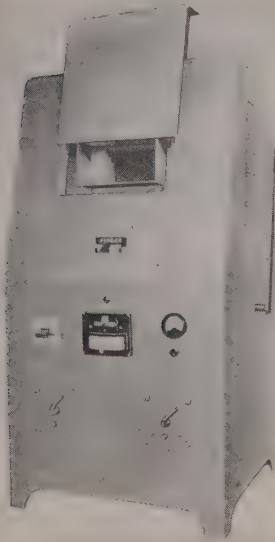
BUCKEYE
"FOR THAT EXTRA SERVICE"
SILICA FIRESTONE

possibility of burning. The gun develops sufficient vacuum to discharge cleaning solutions to a height of over 12 feet.

Check No. 6 on Reply Card for more Details

Laboratory Furnace

Offered ready to use, with all necessary equipment and instruments built in, the Pereco CB-55 electric laboratory and shop furnace is built by Pereny Equipment Co., 893 Chambers Rd., Columbus 12, O., for normal continuous operation at 2500° F



or up to 3000° F for occasional flash firings. Working chamber is 12 inches deep, 8¾ inches wide and 6 inches high. Heat up time is 2 hours.

Furnace is fully automatic, electronically operating and has an indicating and controlling pyrometer. Multitap autotransformer permits close control of power input and prolongs life of elements. The wedge-fit counterbalanced door has a lever which may be used on either right or left side. An interlock prevents manipulation of the transformer switches under load. A circuit breaker cut-off switch protects from overloading.

Check No. 7 on Reply Card for more Details

Magnetic Starters

Designed for starting and protecting motors up to 50 hp, a new line of alternating current magnetic starters, announced by General Electric Co., Schenectady 5, N. Y., is furnished in all NEMA sizes from 0 through 3. Contactors can be furnished in NEMA sizes from 00 through 3. A

CM HERC-ALLOY

America's
First Alloy Steel
Sling Chain



Write for your copy of this new,
informative booklet. No charge.

COLUMBUS-McKINNON

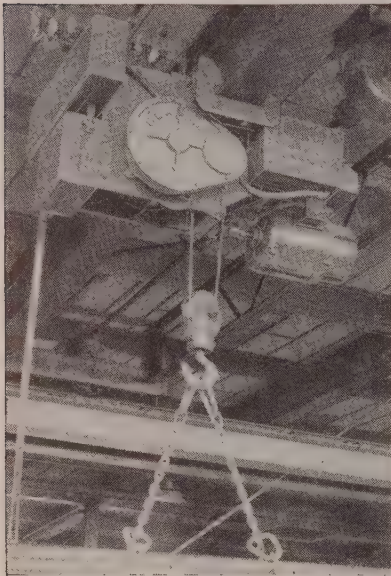
CHAIN CORPORATION

(Affiliated with Chisholm-Moore Hoist Corporation)

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.
SALES OFFICES: NEW YORK, CHICAGO, CLEVELAND AND SAN FRANCISCO

for more output

UNTIE YOUR WORKERS' HANDS!



Six men were moving these steel bars from flat cars to stockpile, and thence to cutting saws and shipping carriers. To speed handling, a Reading Engineer was called in. A Reading Electric Hoist, right angle mounted, plain trolley, on a single I-Beam motor driven crane was recommended and installed. Now the job is handled by only three men . . . bars move faster . . . and the three "extra" men have been switched to other productive jobs!

For an analysis of your handling operations, at no obligation, contact Reading, today. Write for "The Why and How of Faster Production".

READING CHAIN & BLOCK CORPORATION
2102 ADAMS ST., READING, PA.

CHAIN HOISTS • ELECTRIC HOISTS
OVERHEAD TRAVELING CRANES

READING HOISTS

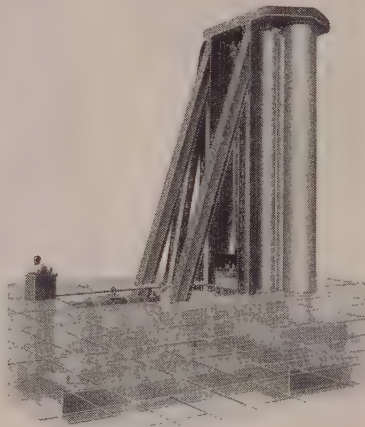
feature is the one-piece, plastic-encased coil enclosure which protects the windings against dirt, moisture or possible damage during installation.

Silver contacts are easy to inspect, interchange and remove without special tools. Their large striking surfaces spread any wear over a broad area. An arc shield of cold-molded asbestos prevents arc-over between contacts. All steel parts are zinc plated. Starters are furnished either open or mounted in general purpose, watertight, dust-tight or hazardous atmosphere enclosures.

Check No. 8 on Reply Card for more Details

Plate Bending Roll

Designed to offset difficulties presented by the conventional horizontal roll, the line of vertical plate bending rolls made by Webb Corp., Webb City, Mo., is for use in rolling large



diameter cylinders of light plate where true diameters must be held during the bending process. The sheet, handled with a jib crane, is inserted on edge into the machine. As it is ejected from the rollers it holds a true diameter because horizontal stress on the rolled plate is greatly reduced.

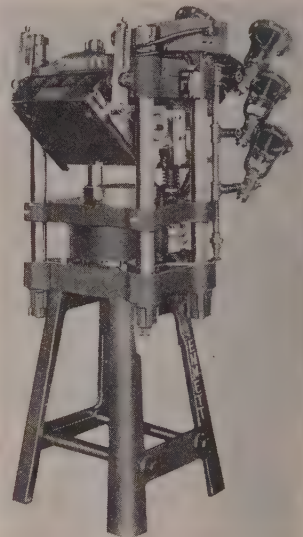
Check No. 9 on Reply Card for more Details

Hydraulic Press

Designed for applications requiring high-speed operation, accuracy of mold register, convenience of loading and ease of stripping molded products from the press is the new Merit tilting-head hydraulic press, built by Emmett Machine & Mfg. Inc., 2249 14th St., Akron 14, O. The model No. E-113 press is offered with 14 x 14 inch or 24 x 24-inch platens. Heated platens are available.

Press operating speed is 3 seconds, including opening or closing of mold

and tilting of head. The small press is recommended for a maximum pressure of 3000 pounds per square inch and the large press for a pressure of 2500 pounds per square inch. Daylight opening on both presses is made



to specification. Normal stroke is 2½ or 6 inches in the small size and 8 inches in the 24 x 24 inch size. Both models can be furnished with self-contained hydraulic power unit, valves, controls and safety interlocks.

Check No. 10 on Reply Card for more Details

Selenium Tank Rectifier

Made of welded aluminum or stainless steel in all sizes from 1 to 100 kilowatts and in all voltages is the Celab selenium tank rectifier, made by Clark Electronic Laboratories, Palm Springs, Calif. for operator of cranes, hoists, machine tools and



elevators. The units have a high power factor and are instant starting. The operation is independent of ambient temperature, atmospheric conditions, dust, dirt and neglect.

Any number of these units may be connected in parallel to supply a larger load, as they automatically equalize without an operator, and cannot feed back. Illustrated is a 10

kilowatt, 3 phase rectifier to supply 250 volts 3-wire direct current. Check No. 11 on Reply Card for more Details

Single Action Press

An all-hydraulic, self-contained Fastraverse single action press, made by Hydraulic Press Mfg. Co., Mount Gilead, O., is designed for the rapid deep drawing and forming of sheet metal. This 100-ton press has a 36 x 48-inch platen, 30-inch daylight and an 18-inch main ram travel. Located in the press bed is a 33-ton hydrau-

control from this point until the work cycle is completed is hydraulic. Feed of the drill is constant, even when breaking through.

A micrometer stop insures depth drilling accuracy to within 0.001-inch. The chuck is a Jacobs ball-bearing type. Drilling units from $\frac{1}{4}$ to 1 horsepower have the same base-to-center-of-spindle dimension. Speeds available are 840, 1150, 1725 and 3450 revolutions per minute for voltages of 209, 220, 440 and 550, 3 phase, 60 cycle. Standard units will operate in any position and may be

used for a variety of operations. Units can be supplied up to 10 horsepower for heavy operation.

Check No. 13 on Reply Card for more Details

Fixed Gap Bed Lathe

Cincinnati Lathe & Tool Co., Cincinnati 9, O., is introducing a new series of fixed gap bed lathes to meet the demands of repair and jobbing shop work which requires a versatile machine. The standard (medium duty) fixed gap bed Cintilathe is offered in six nominal swing sizes—14, 16,



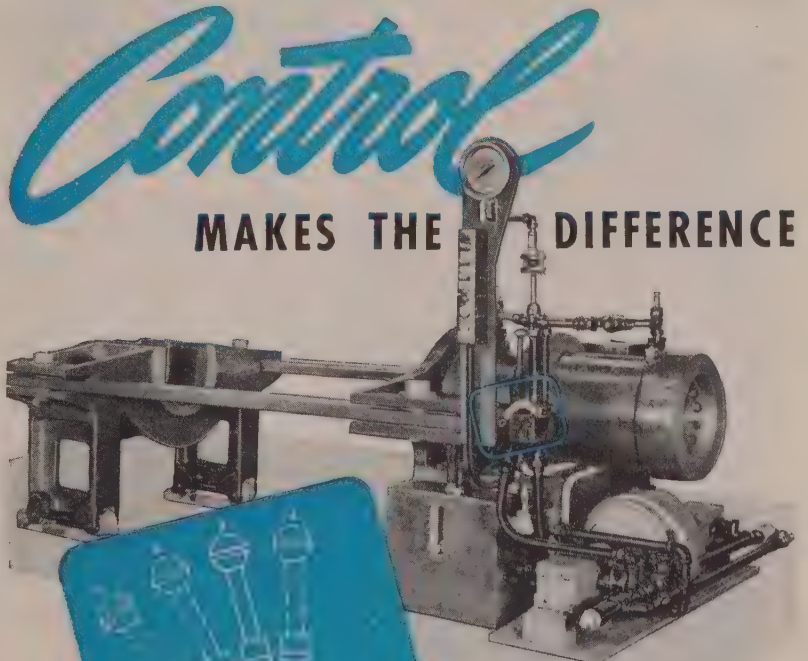
lic die cushion with a 25 x 32-inch platen and 7-inch stroke.

The press frame, consisting of a head and bed, spaced by a pair of uprights, is made of castings and weldments. The head incorporates the hydraulic cylinder with power ram which actuates the main slide; three mechanical knockouts are built into this slide. Pressing speed under full load is 146-inches per minute, operating on a 12-inch working stroke and building up 100 tons pressure on a solid surface. The press will cycle approximately 20 times per minute. Press is powered by a 40 horsepower electric motor directly connected to a radial piston type pump. Three methods of operation are provided—manual, semiautomatic or full automatic.

Check No. 12 on Reply Card for more Details

Drilling Unit

Because spindle and motor rotor are integral, torque is applied evenly around the spindle of the new drilling unit built by Black Industries, 1400 E. 222nd St., Cleveland, O. This rigid construction, using a traversing motor shaft for the work spindle, allows practically no end of play, makes for more accurate drilling and increases drill life. Air feed gives rapid shockless advance to the work;



THIS all-purpose R. D. Wood HYDRO-ELECTRIC Horizontal Forcing Press for general machine shop and maintenance service is ideal for assembly and disassembly of heavy machinery components. *Control makes the difference* . . . control of operation by special lever-operated control valve which permits:

1. Main cylinder on pressure. Pullback cylinder on pressure. High speed forward—
12.7 tons at 400 psi—57"/min.
56 tons at 1,770 psi—12.7"/min.
2. Main cylinder on pressure. Pullback cylinder on exhaust. Slow speed forward—
22.6 tons at 400 psi—32"/min.
100 tons at 1,770 psi—7.2"/min.
3. Neutral—pumps by-passing to oil reservoir.
4. Main cylinder on exhaust. Pullback cylinder on pressure. High speed return stroke—72.5"/min.

Other designs, sizes and capacities are available to meet a complete range of manufacturing and maintenance requirements. Send for detailed specifications or engineering advice. R. D. Wood Company, Public Ledger Bldg., Philadelphia 5, Pa.

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE • ACCUMULATORS • ALLEVIATORS • INTENSIFIERS



R.D. Wood Company
EST. 1903

18, 20, 22 and 24 inches with distances between centers from 30 inches up in increments of 24 inches.

Capacities for the above swing sizes are (in the same order): Swing over gap, 24½, 26½, 28½, 30½, 35½, 38½ inches; approximate distance, end of spindle nose to end of gap, 10, 10, 15, 15, 18½, 18½ inches; swing over bed, 16½, 18½, 20½, 22½, 24½, 27½ inches; swing over bottom slide, 9¼, 11½, 12½, 14¾, 15, 18 inches. Diameters of gap face plates available are 24, 24, 28, 28, 35, 35 inches. Motors supplied as standard are 3, 5, 5, 7½, 10 and 15 horsepower, respectively.

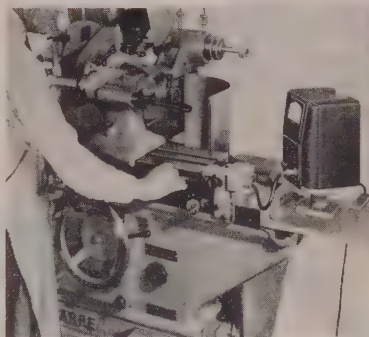
Check No. 14 on Reply Card for more Details

Grinding Table Aligner

Setting the swivel table of a grinding machine to grind a straight shaft or an exact taper becomes a simple and quick adjustment with the Electralign, a device for the electronic adjustment of grinding machine swivel tables, developed by Brown & Sharpe Mfg. Co., Providence 1, R. I. It ignores table pivot condition, table wear which may occur with time, weight of the workpiece and location of the headstock and footstock on

the table. The device locates a strain gage measuring head at each end of the sliding table and measures the movements of the ends of the swivel table.

High sensitivity is obtained and displacements of 0.0001-inch are easily detected and amplified. In the use,



the operator makes a trial grind and measures the work to determine error in taper. With an adjusting screw set to the amount the work was off taper, the swivel table is moved through its regular adjusting mechanism enough to make the meter pointer read zero, the error in taper

then being corrected. This correction may be accomplished during the grinding operation. Brown & Sharpe universal, plain and No. 13 universal and tool grinding machines are obtainable with the Electralign.

Check No. 15 on Reply Card for more Details

Control Center

Dust is excluded from the working parts of motor control devices by the dusttight control center design developed by Square D Co., 4041 North Richards St., Milwaukee 12, Wis. The dusttight design combines standard general purpose control center units with heavily gasketed vertical sections. Each section is an independent enclosure of heavy gage steel. All seams are welded and a large vault type door handle operates three-point roller guided locking bars.

Rear access plates have closely spaced mounting bolt for gasket tightness and handles for easy removal and replacement. Eye bolts on top facilitate handling. Units are available with circuit breakers through 600 amperes, starters through NEMA size 5, lighting transformers and panelboards. Master load and con-

ACCEPTED

BY AMERICA'S LARGEST
INDUSTRIAL PLANTS
TO DO THE TOUGHEST
BLASTING AND PEENING
OPERATIONS



FAMOUS

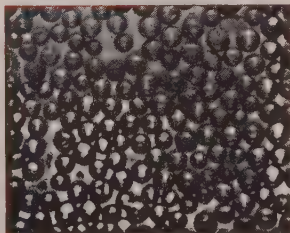
FOR ITS ABILITY
TO STAND UP
UNDER REPEATED
HARD USE

SHOT

- ROUND
- UNIFORM IN SIZE
- UNIFORM IN HARDNESS
- LACKS IRREGULAR SHAPES

GRIT

- RECTANGULAR
- SHARP
- TOUGH
- DURABLE

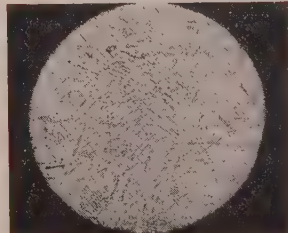


UNRETouched PHOTO OF
HI-GRADE SHOT

**CLAYTON-SHERMAN
ABRASIVES COMPANY**

3896 LONYO ROAD
DETROIT 10, MICHIGAN

CEdar 7200



MICROSCOPIC STRUCTURE
OF METAL

trol terminal blocks are optional. Control centers are offered in NEMA type I general purpose and type III weather resistant, as well as the dust-tight.

Check No. 16 on Reply Card for more Details

Oven Fuel Converter

Industrial ovens, furnaces and boilers fired with gas but which do not lend themselves to the substitution of direct oil burners may be converted with the new Oiltogas converter, offered by North American Mfg. Co., 4455 East 71st St., Cleveland 5, O. The

gas consumption rates can be obtained through the use of this new unit. The mixer-type blowpipe uses an Oxweld W-42 machine heating blowpipe for mixing of preheat gases. Medium pressure acetylene is supplied from an acetylene generator or from manifolded cylinders.

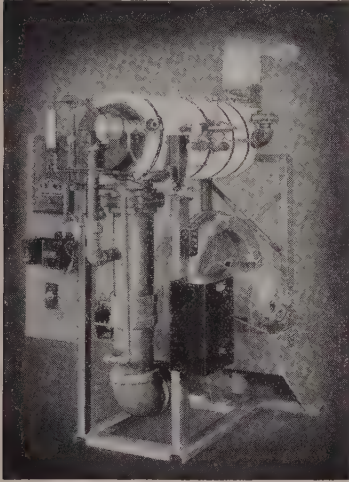
Check No. 18 on Reply Card for more Details

Adjustable Blade Chaser

Each unit, chaser, holder and slide, of the adjustable blade chaser units made by National Acme Co., Cleveland 8, O., for limited production

lots of both threading and hollow milling work, is quickly interchangeable with Vers-o-tool equipped circular chaser units normally used for long run production. These chasers, made in either NF, NC or national standard pipe thread, make available a wide threading range with low tool inventory. A micrometer gage is used to adjust the blade chaser and holder to a predetermined setting on the slide, according to the material being cut.

Chasers and holders for $\frac{3}{8}$ and $\frac{1}{2}$ -inch Brown and Sharpe sizes are interchangeable. The former has one



converter supplies high temperature air to the point in the piping where gas and air are ordinarily mixed. At this point, atomized oil is introduced into the hot air stream, immediately vaporizing and burning in any type or style of gas burner.

As existing gas burners and piping are not altered, changing from gas to oil and back again is easily done. Converter will vaporize and burn No. 1, 2 or 3 oil without forming carbon or condensate. Units are available in capacities of 1, 2, 4, 6 and 8 million Btu.

Check No. 17 on Reply Card for more Details

Cutting Blowpipe

Steel over 6 feet thick is within the cutting range of the Oxweld C-60 machine cutting blowpipe, announced by Linde Air Products Co., 30 East 42nd St., New York 17, N. Y. It was designed for such scrap cutting operations as performed on skulls and buttons. With its powder cutting attachment, this blowpipe is suited to cutting scrap having more than a normal amount of cinder and slag inclusions.

Greater depths of cut at lower oxy-

Protects structural steel work, or concrete against deterioration from corrosive fumes, gases, or atmospheres . . . resists acid spillage or condensates.

Flexible, tight-adhering plastic film resists impact; will not chip, flake or craze. Proven over a 10-year period in America's chemical plants.



Write today for your free copy of Bulletin 709. Learn how you can cut corrosion losses with Tygon Paint. Address Plastics & Synthetics Division, The U. S. Stoneware Co., Akron 9, Ohio.



U. S. STONEWARE

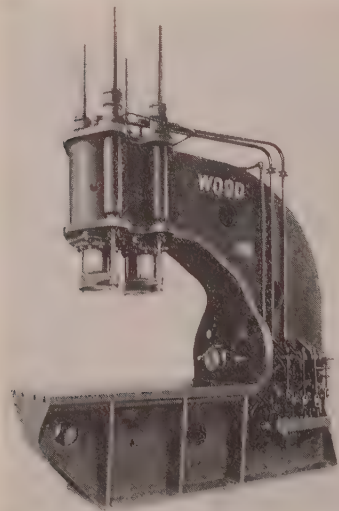
Akron 9, Ohio

slide for a cutting range of 0 to $\frac{1}{8}$ -inch; the latter head has two slides for 0 to $\frac{1}{8}$ -inch and 29/64 to 11/16-inch. To change to either side head, only the slides are replaced.

Check No. 19 on Reply Card for more Details

Flanging Press

Designed for use in sectional flanging operations, the hydraulic press is announced by R. D. Wood Co., 12 South 12th St., Philadelphia 7, Pa., may also be used for joggling and up-setting work. It delivers a 200-ton capacity with the two vertical main rams operated in unison. Capacity



with a single vertical ram is 100 tons.

Horizontal ram with a 72-ton capacity has a detachable cross-head of cast open-hearth steel with bore and tapered key slot for attachment of tooling. A pulpit arrangement locates the operating valves. Arranged for accumulator operation and equipped for connection to accumulator pipe line, the press may also be furnished self-contained, with complete pumping units and control equipment. Designs for this press are also available from 150 to 300 tons.

Check No. 20 on Reply Card for more Details

* * *

COUNTERSINKS: Aero Tool Co., Los Angeles 3, Calif., offers a line of high speed steel spiral fluted countersinks in $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{5}{8}$ -inch diameters with $\frac{1}{4}$ -inch shanks and $\frac{3}{4}$ and 1 inch diameters with $\frac{1}{2}$ -inch shanks.

Check No. 21 on Reply Card for more Details

TACKER: Model T-5 trigger action tacker for driving staples into wood

and other material is offered by Bostitch, Westerly, R. I. Useful in shipping departments, this unit is available in three models using light, medium and heavy wire staples of several different lengths.

Check No. 22 on Reply Card for more Details

HACKSAW BLADE: Known as Jet-Edge, a high speed hacksaw blade that is shatterproof and unbreakable is introduced by Millers Falls Co., Greenfield, Mass.

Check No. 23 on Reply Card for more Details

ROTARY DRYER: Rotomaster, made by Lott Mfg. Co., Jamestown, N. Y., is a rotary dryer for photographs, photo copies, blue prints and similar types of reproduction. It dries both glossy and matte finish prints.

Check No. 24 on Reply Card for more Details

AIR-OPERATED CLAMP: Known as AO-400, a new model clamp is offered by Lapeer Mfg. Co., Lapeer, Mich. Maximum clamping pressure is 400 pounds. It is double acting and will not release clamped work in case air pressure accidentally fails.

Check No. 25 on Reply Card for more Details

BATTERY CHARGE INDICATOR: Gould Storage Battery Corp., Trenton, N. J., offers a new charge indicator which gives the momentary charge condition of the battery. It is mounted on the dashboard of the industrial truck.

Check No. 26 on Reply Card for more Details

AIR LINE MUFFLER: Atomuffler, developed by Allied Witan Co., Cleveland 14, O., disperses the sound of compressed air without retarding the performance of air mechanism.

Check No. 27 on Reply Card for more Details

SOLDERING FLUX: AMCO 323 fluxing stick, offered by American Solder & Flux Co., Philadelphia 25, Pa., may be used for general soldering work on all metals except aluminum.

Check No. 28 on Reply Card for more Details

RECORDERS: A new line of gas filled temperature recorders and recording pressure gages with one, two, three or four pens is offered by Penn Industrial Instrument Corp., Philadelphia 32, Pa.

Check No. 29 on Reply Card for more Details

ALIGNMENT CONES: For accurate alignment and security in wood pallet tiering, Paltier Corp., Chicago 5, Ill., offers steel alignment cone as-

sembly which are fastened at the four corners of the wooden pallet by an adjustable lock nut.

Check No. 30 on Reply Card for more Details

DRAG CLAMP: For those requiring a fast, safe and simple method for conveying cumbersome sheets, plates and flat stock around the plant, Merrill Brothers, Maspeth, N. Y., introduces the Drag clamp.

Check No. 31 on Reply Card for more Details

PACKLESS VALVES: Type R valves, available from Vacuum Electronic Engrg. Co., Brooklyn 32, N. Y., are 90 degree packless valves of the bellows type. Designed for minimum flow resistance in high vacuum service, they are supplied in sizes up to 3 inches.

Check No. 32 on Reply Card for more Details

CYLINDER CAP: A new and improved octagon shaped cylinder cap is announced by Compressed Gas Cylinders Inc., Vernon, Calif. Made of pickled drawing steel, the standard size cap is 6 inches high by $3\frac{1}{2}$ inches in diameter and is threaded with 11 threads to the inch.

Check No. 33 on Reply Card for more Details

EXPANSION JOINT: Pipe line movement, axial, lateral, transverse or vibratory, is taken up uniformly by each self-equalizing corrugation of the Omega expansion joint announced by Marquette Coppersmithing Co., Philadelphia 47, Pa. Joints are made with an inside diameter from $\frac{1}{2}$ -inch to 25 feet for any pressure from vacuum to 50,000 pounds.

Check No. 34 on Reply Card for more Details

HARD FACING RODS: Two iron-base hard facing rods, designated as Haynes 90 and 92 alloys, have been developed by Haynes Stellite Co., Kokomo, Ind. Haynes 90 is highly resistant to conditions of impact, abrasion and heat. The other rod is a moderately low melting point hard facing material that is resistant to the most severe abrasion.

Check No. 35 on Reply Card for more Details

FOR MORE INFORMATION

on the new products and equipment in this section, fill in a card. It will receive prompt attention.

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COMPOSITE MARKET AVERAGES

Arithmetical Price Composites*

	Feb. 12	Feb. 5	Month	Year	5 Years
			Ago	Ago	Ago
			Jan. 1949	Feb. 1949	Feb. 1944
Finished Steel	\$97.77	\$97.77	\$97.75	\$79.86	\$56.73
Semifinished Steel	75.75	75.75	75.75	67.16	36.00
Steelmaking Pig Iron	46.22	46.22	46.26	39.30	23.00
Steelmaking Scrap	38.83	39.42	41.54	40.48	19.17

* **STRAIGHT ARITHMETICAL COMPOSITES:** Computed from average industry-wide mill prices on Finished Carbon Steel (hot-rolled sheets, cold-rolled sheets, cold-rolled strip, hot-rolled bars, plates, structural shapes, basic wire, standard nails, tin plate, standard and line pipe), on Semifinished Carbon Steel (re-rolling billets and slabs, sheet bars, skelp, and wire rods, on Basic Pig Iron (at eight leading producing points), and on Steelworks Scrap (No. 1 melting grade at Pittsburgh, Chicago and eastern Pennsylvania). Steel arithmetical composites, dollars per net ton; pig iron and scrap, gross ton.

+ **FINISHED STEEL WEIGHTED COMPOSITE:** Computed in cents per pound, mill prices, weighted by actual monthly shipments of following products, representing about 82 per cent of steel shipments in the latest month for which statistics are available, as reported by American Iron & Steel Institute: Structural shapes; plates, standard rails; hot and cold-finished carbon bars; black butt weld pipe and tubes; black lap weld pipe and tubes; black electric weld pipe and tubes; black seamless pipe and tubes; drawn wire; nails and staples; tin andterne plate; hot-rolled sheets; cold-rolled sheets; galvanized sheets; hot-rolled strip; and cold-rolled strip. January, 1949, figure is preliminary.

FINISHED STEEL
WEIGHTED COMPOSITE†

Jan. 1949	4.20563c
Dec. 1948	4.14190c
Nov. 1948	4.11778c
Jan. 1948	3.49997c
Jan. 1944	2.41455c

COMPARISON OF PRICES

Representative market figures for current week; average for last month, three months and one year ago. Finished material (except tin plate) and wire rods, cents per lb; semifinished (except wire rods) and coke, dollars per net ton, others dollars per gross ton. Delivered prices represent lowest from mills.

Finished Materials

	Feb. 12,	Jan.	Nov.	Feb.
	1949	1949	1948	1948
Steel bars, Pittsburgh mills	3.45c	3.45c	3.45c	2.90c
Steel bars, del. Philadelphia	3.5164	3.5094	3.79	3.35c
Steel bars, Chicago mills	3.35	3.35	3.35	2.90
Shapes, Pittsburgh mills	3.275	3.275	3.275	2.80
Shapes, Chicago mills	3.25	3.25	3.25	2.90
Shapes, del. Philadelphia	3.4918	3.4888	3.48	2.968
Plates, Pittsburgh mills	3.50	3.50	3.50	2.95
Plates, Chicago mills	3.40	3.40	3.40	2.95
Plates, del. Philadelphia	3.7256	3.7217	3.71	3.19
Sheets, hot-rolled, Pittsburgh mills	3.275	3.275	3.275	2.80
Sheets, cold-rolled, Pittsburgh	4.00	4.00	4.00	3.55
Sheets, No. 10 galv., Pittsburgh	4.40	4.40	4.40	3.95
Sheets, hot-rolled, Gary mills	3.25	3.25	3.25	2.80
Sheets, cold-rolled, Gary mills	4.00	4.00	4.00	3.55
Sheets, No. 10 galv., Gary mills	4.40	4.40	4.40	3.95
Strip, hot-rolled, Pittsburgh mills	3.275	3.275	3.275	2.925
Strip, cold-rolled, Pittsburgh mills	4.375	4.375	4.375	3.475
Bright basic, wire, Pittsburgh	4.325	4.325	4.325	3.775
Wire nails, Pittsburgh mills	5.775	5.775	5.775	4.95
Tin plate, per base box, Pitts. dist.	\$6.70	\$6.80	\$6.80	\$6.70

Pig Iron

	Feb. 12,	Jan.	Nov.	Feb.
	1949	1949	1948	1948
Bessemer, del. Pittsburgh (N.&S. sides)	\$48.05	\$48.05	\$48.05	\$40.996
Basic, Valley	46.00	46.00	46.00	39.00
Basic, eastern del. Philadelphia	50.3002	50.2676	50.17	42.004
No. 2 fdry., del. Pgh. (N.&S. sides)	47.58	47.58	47.58	40.496
No. 2 fdry., del. Philadelphia	50.8002	50.7676	50.67	42.504
No. 2 foundry, Chicago	46.25	46.25	46.25	39.00
No. 2 foundry, Valley	46.50	46.50	46.50	39.50
Southern No. 2 Birmingham	43.38	43.38	43.38	37.88
Southern No. 2 del. Cincinnati	49.43	49.35	49.09	40.74
Malleable, Valley	46.50	46.50	46.50	39.50
Malleable, Chicago	46.50	46.50	46.50	39.50
Charcoal, low phos., Tol. Lys. Tenn.	66.00	66.00	66.00	55.00
Ferromanganese, f.o.b. Etna, Pa.	163.00	163.00	163.00	151.00

* F.o.b. cars Pittsburgh.

Scrap

Heavy melt, steel, No. 1, Pittsburgh	\$41.00	\$41.90	\$42.75	\$40.44
Heavy melt, steel, No. 2, E. Pa.	35.00	40.00	41.50	39.125
Heavy melt, steel, No. 1, Chicago	36.00	39.38	41.75	39.125
Heavy melt, steel, No. 1 Valley	37.75	39.75	42.75	40.25
Heavy melt, steel, No. 1 Cleveland	37.25	39.25	42.25	39.75
Heavy melt, steel, No. 1, Buffalo	40.50	45.88	48.50	43.63
Rails for re-rolling, Chicago	48.00	50.38	51.00	46.00
No. 1 cast, Chicago	44.00	58.38	70.50	66.00

Coke

Connellsville, beehive furnace	\$14.50	\$14.50	\$14.50	\$12.50
Connellsville, beehive foundry	17.00	17.00	17.00	14.78
Chicago, oven foundry, ovens	20.40	20.40	20.40	18.00

FINISHED AND SEMIFINISHED IRON, STEEL PRODUCTS

Finished steel quoted in cents per pound and semifinished in dollars per net ton, except as otherwise noted. Prices apply on an individual producer basis to products within the range of sizes, grades, finishes and specifications produced at its plants.

Semifinished Steel

Carbon Steel Ingots: Re-rolling quality, standard analysis, open market, \$100-\$105 per gross ton. Forging quality, \$50 per net ton, mill.

Alloy Steel Ingots: \$51 per net ton, mill.

Re-rolling Billets, Blooms, Slabs: \$52 per net ton, mill, except: \$62, Conshohocken, Pa.; \$66, Monessen, Pa.; sales by smaller interests on negotiated basis at \$65 per gross ton, or higher.

Forging Quality Billets, Blooms, Slabs: \$61 per net ton, mill, except: \$65, Conshohocken, Pa., mill.

Alloy Billets, Slabs, Blooms: Re-rolling quality, \$63 per net ton, mill except: \$70, Conshohocken, Pa.

Sheet Bars: \$87 nom., per net ton, mill; sales in open market \$110-\$115 per gross ton.

Skelp: 3.25c per lb, mill.

Tube Rounds: \$76 per net ton, mill; some sellers quoting up to \$120 per gross ton.

Wire Rods: Basic and acid open-hearth, 7/32 & 1/2-inch, inclusive, 3.40c per lb, mill, except: 3.65c, Struthers, O.; 3.70c, Worcester, Mass.; 4.05c, Pittsburgh, Calif.; 4.10c, Portsmouth, O.; Los Angeles; 4.15c, Monessen, Pa. One producer quotes 3.90c, Chicago base.

Basic open-hearth and bessemer, not resulphurized, 7/32 to 47/64-inch, inclusive, 3.50c, mill.

Bars

Hot-Rolled Carbon Bars (O.H. only; base 20 tons): 3.35c, mill, except: 3.55c, Ecorse, Mich., Pittsburgh, Monessen, Alliquippa, Pa.; 4.05c, Pittsburgh, Torrance, Calif.; 4.10c, S. San Francisco, Los Angeles, Niles, Calif., Portland, Oreg., Seattle; 4.20c, Kansas City, Mo.; 4.25c, Minneapolis, Colo.; 4.40c, Atlanta; 5.30c, Fontana, Calif.

Rail Steel Bars (Base 10 tons): 3.35c, Moline, Ill., 5.10c, Williamsport, Pa.; another interest quotes 5.35c, mill.

Hot-Rolled Alloy Bars: 3.75c, mill, except: 4.05c, Ecorse, Mich.; 4.80c, Los Angeles; 5.50c, Fontana, Calif.

Cold-Finished Carbon Bars (Base 40,000 lb and over): 4.00c, mill, except: 3.95c, Pittsburgh, Cumberland, Md.; 4.20c, Indianapolis; 4.25c, Monessen, Pa.; 4.30c, Ecorse, Mich.; 4.35c, St. Louis; 4.36c, Plymouth, Mich.; 4.40c, Newark, N. J.; Hartford, Putnam, Conn.; Mansfield, Readville, Mass.; 4.50c, Camden, N. J.; 5.30c, Los Angeles.

Cold-Finished Alloy Bars: 4.65c, mill, except: 4.75c, Monessen, Pa.; 4.85c, Indianapolis; 4.95c, Worcester, Mansfield, Mass., Hartford.

High-Strength, Low-Alloy Bars: 5.10c, mill, except 5.30c, Youngstown; 5.40c, Ecorse, Mich.

Reinforcing Bars (New Billet): 3.35c, mill, except: 3.55c, Monessen, Pa.; 4.05c, Pittsburgh, Torrance, Calif.; 4.10c, Atlanta, Seattle, S. San Francisco, Los Angeles; 4.25c, Minneapolis, Colo. Fabricated to consumers: 4.25c, mill, except: 5.00c, Seattle.

Reinforcing Bars (Rail Steel): 4.65c, Williamsport, Pa.; mill; another interest quotes 5.35c, mill.

Wrought Iron Bars: Single Refined: 8.60c, (hand puddled), McKees Rocks, Pa.; 9.50c, Economy, Pa. Double Refined: 11.25c (hand puddled), McKees Rocks, Pa.; 11.00c, Economy, Pa. Staybolt: 12.75c, (hand puddled), McKees Rocks, Pa.; 11.30c, Economy, Pa.

Sheets

Hot-Rolled Sheets (18 gage and heavier): 3.25c, mill, except: 3.25-3.30c, Cleveland; 3.30c, Pittsburgh; 3.45c, Ecorse, Mich.; 3.95c, Pittsburgh, Torrance, Calif.; 5.00c, Conshohocken, Pa.; 5.65c, Fontana, Calif.; 6.25c, Kansas City, Mo.

Hot-Rolled Sheets (19 gage and lighter, annealed): 4.15c, mill, except: 4.40c, Alabama City, Ala.; 4.65c, Niles, O.; 5.05c, Torrance, Calif.; Kokomo, Ind.

Cold-Rolled Sheets: 4.00c, mill, except: 4.20c, Ecorse, Mich.; 4.70c, Granite City, Ill.; 4.95c, Pittsburgh, Calif.

Galvanized Sheets, No. 10: (Based on 5 cent zinc) 4.40c, mill, except: 5.00c, Niles, O.; 5.15c, Pittsburgh, Torrance, Calif.; 5.30c, Kokomo, Ind.

Galvannealed Sheets: 4.95c, mill, except: 5.05c, Indiana Harbor, Ind.; 5.55c, Niles, O.; 5.70c, Kokomo, Ind.

Cuvert Sheets, No. 16 flat Copper Steel (based on 5-cent zinc): 5.00c, mill, except: 5.40c, Granite City, Ill.; 5.45c, Kokomo, Ind.; 5.75c, Pittsburgh, Torrance, Calif.

Long Terns, No. 10 (Commercial quality): 4.80c, mill.

Enameling Sheets, No. 12: 4.40c, mill, except: 4.60c, Granite City, Ill.; 4.70c, Ecorse, Mich.; 6.00c, Niles, O.

Silicon Sheets, No. 24: Field: 5.15c, mill. Armature: 5.45c, mill, except: 5.95c, Warren, O.; 6.05c, Niles, O.

Electrical: Hot-rolled, 5.95c, mill, except: 6.05c, Kokomo, Ind.; 6.15c, Granite City, Ill.; 6.45c, Warren, O.; 6.55c, Niles, O.

Motor: 6.70c mill except: 6.90c, Granite City, Ill.; 7.20c, Warren, O.; 7.95c, Follansbee, W. Va., Toronto, O.; 9.20c, Brackenridge, Pa.

Dynamo: 7.50c, mill, except: 8.65c, Follansbee, W. Va., Toronto, O.; 7.70c, Granite City, Ill.; 10.00c, Brackenridge, Pa.

Transformer 72, 8.05c, mill, except: 9.15c, Follansbee, W. Va., Toronto, O.; 11.80c, Brackenridge, Pa.; 65, 8.60c, mill, except: 9.85c, Follansbee, W. Va., Toronto, O.; 12.35c, Brackenridge, Pa.; 58, 9.30c, mill, except: 10.55c, Follansbee, W. Va., Toronto, O.

10.05c, Brackenridge, Pa.; 52, 10.10c, mill, except: 11.35c, Follansbee, W. Va., Toronto, O.

High-Strength Low-Alloy Sheets: Hot-rolled, 4.95c, mill, except: 5.15c, Youngstown; 5.25c, Ecorse, Mich., and Conshohocken, Pa., mills.

Galvanized (No. 10), 6.75c, mill.

Cold-rolled, 6.05c, mill, except: 6.25c, Youngstown; 6.35c, Ecorse, Mich.

rip

1-Rolled Strip: 3.25c mill, except: 3.30c, veland, Pittsburg, Riverdale, Ill.; 3.25-5c, Sharon, Pa.; 3.40c, Ecorse, Mich.; 3c, Detroit; 3.60c, Atlanta; 3.70c, West schburg, Pa.; 4.00c, Pittsburg, Torrance, Ill.; 4.25c, Seattle, S. San Francisco, Los gies; 4.20c, Kansas City, Mo.; 4.30c, Minqua, Colo.; 5.00c Fontana, Calif. One comy quotes 4.90c, Pittsburg base.

Wider than 6-in. and 6-in. and narrower re-ctively.

1d-Rolled Strip (0.25 carbon and less); 90c, mill, except 4.00-4.25c, Warren, O.; 4.0-5.00c, Youngstown; 4.20c, Ecorse, Mich.; 4.5c, Riverdale, Ill.; 4.40-4.50c, Detroit; 90c, New Haven, Conn., West Leechburg, w Castle, Pa., Boston; 4.75c, Dover, O.; w Kensington, Pa.; 4.50-5.00c, Trenton, N. J.; 4.80-5.05c, Wallingford, Conn.; 5.75c, Los angeles; 7.10c, Fontana, Calif. One company otes 4.55c, Cleveland or Pittsburgh base. 4.25 and 4.30c, Worcester, Mass., base; another, 90c, Pittsburg base.

1d-Finished Spring Steel: 0.26-0.40 C, 4.00c, ll, except: 4.25c, Dover, O.; Chicago; 4.30c, reester, Mass.; 4.50c, New Castle, Pa., Bos-; Youngstown; 4.75c, Wallingford, Conn. er 0.40 to 0.60 C, 5.50c, mill, except: 5.65c, iago; 5.75c, Dover, O.; 5.80c, Worcester, ss., Wallingford, Conn., Trenton, N. J.; 5c, Boston; 6.00c, New Castle, Pa. Over 0 to 0.80 C, 6.10c, mill, except: 6.25c, Chi-; 6.35c, Dover, O.; 6.40c, Worcester, ss., Wallingford, Bristol, Conn., Trenton, J.; 6.60c, New Castle, Pa. Over 0.80 to 5 C, 8.05c, mill, except: 7.85c, Dover, O.; 90c, Chicago; 8.35c, Worcester, Mass., Bris-; 90c, Trenton, N. J. Over 1.05 to 1.35 C, 10.35c, mill, except: 10.15c, Dover, O.; 30c, Wallingford, Conn.; 10.50c, Chicago; 85c, Worcester, Mass., Trenton, N. J.

1d-Rolled Alloy Strip: 9.50c, mill except: 90c, Worcester, Mass.

High-Strength, Low-Alloy Strip: Hot-rolled, 90c, mill, except: 5.15c, Youngstown; 5.25c, orse, Mich., mill. Cold-rolled, 6.05c, mill, cept: 6.25c, Youngstown; 6.35c, Ecorse, ch., mill.

in, Terne Plate

a Plate: American Coke, per base box of 5 lb, 1.25 lb coating \$7.50-\$7.70; 1.50 lb abing \$7.75-\$7.95. Pittsburg, Calif., mill. 25 and \$3.50, respectively, for 1.25 and 50 lb coatings.

Electrolytic Tin Plate: Per base box of 100 lb, 25 lb tin, \$6.45-6.65; 50 lb tin, \$6.70-6.90; 0.75 lb tin, \$7.00-\$7.20.

1n Making Black Plate: Per base box of 100 lb, 5 to 125 lb basis weight \$5.75-\$5.85. Pittsburg, Calif., mill, \$6.50.

olloware Enameling Black Plate: 29-gage, 30c per pound, except: 5.40c, Sparrows Point, Md.; 5.50c, Granite City, Ill. **Manufacturing Terns:** (Special Coated): Per se box of 100 lb, \$6.65, except: \$6.75 Fair-ld, Ala., Sparrows Point, Md. **Coating Terns:** Per package 112 sheets; 20 x in., coating I.C. 8-lb, \$15.50.

lates

arbon Steel Plates: 3.40c, mill, except: 3.40-60c, Cleveland; 3.45c, Sparrows Point, Md., Johnston, Pa., Lackawanna, N. Y.; 3.60c, ittsburg; 3.65c, Ecorse, Mich.; 3.75c, atesville, Pa.; 3.95c, Claymont, Del., Conshocken, Pa.; 4.30c, Seattle, Minnequa, o.; 4.55c, Houston, Tex.; 5.80c, Fontana, nhf.; 6.50c, Harrisburg, Pa.; 6.25c, Kansas ty, Mo.

oor Plates: 4.55c, mill.

10c North Al Plate: 4.40c, mill, except: 10c, Coatesville, Pa., mill.

igh-Strength, Low-Alloy Plates: 5.20c mill, cept: 5.10c, Coatesville, Pa.; 5.30c, Conshocken, Pa., Sparrows Point, Md., Johnston, a.; 5.40c, Youngstown; 5.65c, Ecorse, Mich., aron, Pa.

hapes

tructural Shapes: 3.25c, mill, except: 3.30c, etlehem, Pa., Lackawanna, N. Y., Johns-wn, Alliquippa, Pa.; 3.85c, Torrance, Calif.; 15c, Minnequa, Colo.; 4.30c, Seattle, S. San ranico, Los Angeles; 5.75c, Fontana, Calif. **lloy Structural Shapes:** 4.05c, mill. **eel Sheet Piling:** 4.05c, mill.

igh-Strength, Low-Alloy Shapes: 4.95c, mill, cept: 5.05c, Bethlehem, Johnston, Pa., ackawanna, N. Y.; 5.15c, Youngstown.

Wire and Wire Products

Wire to Manufacturers (carloads): Bright, asic or Bessemer Wire, 4.15c, mill, except: 25c, Sparrows Point, Md., Kokomo, Ind.; 4.25c, Worcester, Mass.; 4.50c, Monessen, Pa.; Minnequa, Colo., Atlanta; 4.70c, ortsmouth, O.; 4.80c, Palmer, Mass.; 5.10c, ittsburg, Calif.; 5.15c, S. San Fran-isco; 5.40c, Shelton, Conn. One producer

quotes 4.50c, Chicago base; another, 4.50c, Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

Basic MB Spring Wire, 5.55c, mill, except: 5.30c, Portsmouth, O.; 5.65c, Sparrows Point, Md., Monessen, Pa.; 5.85c, Worcester, Palmer, Mass., Trenton, N. J.; 6.50c, Pittsburg, Calif. **Upholstery Spring Wire,** 5.20c mill, except: 5.30c, Sparrows Point, Md., Williamsport, Pa.; 5.50c, Worcester, Mass., Trenton, N. J., New Haven, Conn.; 6.15c, Pittsburg, Calif.

Wire Products to Trade (carloads): Merchant Quality Wire: Annealed (6 to 8 Gage base), 4.80c, mill, except: 4.90c, Sparrows Point, Md.; 4.95c, Monessen, Pa.; 5.10c Worcester, Mass.; 5.15c, Minnequa, Colo., Kokomo, Ind.; 5.20c, Atlanta; 5.75c, S. San Francisco, Pittsburg, Calif. One producer quotes 5.15c, Chicago and Pittsburgh base; another, 5.20c. Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

Galvanized (6 to 8 Gage base), 5.25c, mill, except: 5.35c, Sparrows Point, Md.; 5.40c, Alliquippa, Monessen, Pa.; 5.55c, Worcester, Mass.; 5.60c, Kokomo, Ind., Minnequa, Colo.; 5.65c, Atlanta; 6.20c, Pittsburg, S. San Francisco, Calif. One producer quotes 5.60c, Pittsburgh and Chicago base; another, 5.65c. Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

Nails and Staples: Standard, cement-coated and galvanized nails and polished and galvanized staples, Column 103, mill, except: 105, Sparrows Point, Md., Kokomo, Ind.; 109 Worcester, Mass.; 110, Minnequa, Colo., Atlanta; 117, Portsmouth, O.; 123, Pittsburg, Calif.; 124, Cleveland; 126, Monessen, Pa.; \$6.75c per 100 pound keg, Conshocken, Pa., Wheeling, W. Va. One producer quotes column 109, Chicago and Pittsburgh base; another, column 113, Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

Woven Fence (9 to 15½ gage, inclusive): Column 109, mill, except: 113, Monessen, Pa., Kokomo, Ind.; 116, Minnequa, Colo.; 121, Atlanta; 132, Pittsburg, Calif. One producer quotes column 113, Pittsburgh and Chicago base; another column 114, Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

Barbed Wire: Column 123 mill, except: 125, Sparrows Point, Md., Kokomo, Ind.; 126, Atlanta; 128, Monessen, Pa.; 130, Minnequa, Colo.; 143, Pittsburg, Calif.; 145, S. San Francisco. One producer quotes 127, Chicago and Pittsburgh base.

Fence Posts (with clamps): Column 114, Duluth; 115, Johnston, Pa.; 116, Moline, Ill.; 122, Minnequa, Colo.; \$123.50 per net ton, Williamsport, Pa.

Bale Ties (single loop): Column 106, mill, except: 108, Sparrows Point, Md., Kokomo, Ind.; 110, Atlanta; 113 Minnequa, Colo.; 130, S. San Francisco, Pittsburg, Calif. One producer quotes col. 115, Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

Stainless Steels

(Mill prices, cents per pound)

CHROMIUM NICKEL STEELS				
Type	Bars, Wire	Strip, Cold-Rolled	Sheets	
301.....	28.50-28.75	30.50-32.00	37.50-40.75	
302.....	28.50-28.75	33.00-33.75	37.50-40.75	
303.....	31.00-31.50	36.00-39.75	39.50-43.00	
304.....	30.00-31.25	35.00-35.75	39.50-43.00	
316.....	46.00-48.00	45.00-47.25	53.00-57.25	
321.....	34.00-34.75	44.50-45.75	45.50-49.00	
347.....	38.50-39.75	48.50-50.25	50.00-54.00	

STRAIGHT CHROMIUM STEELS			
410.....	22.75-23.00	26.50-27.00	32.00-33.00
416.....	23.25-23.50	28.25-33.50	32.50-33.50
430.....	23.25-23.50	27.00-27.50	34.75-35.50
446.....	32.50-33.00	60.00-62.25	46.50-50.00

STAINLESS-CLAD STEELS				
Type	Plates		Sheets	
	10%	20%	10%	20%
302.....	22.50	26.50	19.75	21.50
310.....	32.50	36.50	.....	.....
316.....	27.00	31.00	26.00	28.00
321.....	23.50	27.50	.....	.....
347.....	25.00	29.00	24.00	26.00
406.....	18.75	24.75	.....	.....
410.....	18.25	24.25	.....	.....
430.....	18.25	24.25	.....	.....

Tool Steels

Tool Steel: Cents per pound, producing plants; rex carbon 19.00c; extra carbon 22.00c; special carbon 26.50c; oil-hardening 29.00c; high carbon-chromium 52.00c; chrome hot work, 29.00c.

W	Cr	V	Mo	Co	Base Per lb
18	4	1	...	...	90.50c
18	4	2	...	...	102.50c
18	4	5	...	...	114.50c
18	4	2	...	9	168.50c
1.5	4	1	8.5	...	65.00c
6.4	4.5	1.9	5	...	69.50c
6	4	3	6	...	88.00c

Tubular Goods

Standard Steel Pipe: Mill prices in carlots, threaded and coupled, to consumers about \$200 a net ton.

In.	Bk.	Gal.	Butt Weld In.	Bk.	Gal.
1/8.....	39 1/2	5 1/2	1.....	46	25
1/4.....	41 1/2	12 1/2	1 1/8.....	48 1/2	27 1/2
3/8.....	37 1/2	9 1/2	1 1/4.....	46 1/2	25 1/2
1/2.....	39 1/2	14	1 1/2.....	49	28
3/4.....	34	4 1/2	1 3/4.....	47	28
1.....	36	9	2.....	49 1/2	28 1/2
1 1/8.....	40 1/2	18	2 1/4.....	47 1/2	26 1/2
1 1/4.....	43	21 1/2	2 1/2.....	50	29
1 1/2.....	43 1/2	22	2 3/4.....	48	27
1 3/4.....	46	24 1/2	3.....	50 1/2	29 1/2
			3 1/4 & 4.....	44 1/2	22 1/2

In.	Bk.	Gal.	Elec. Weld In.	Bk.	Gal.
2.....	39 1/2	17 1/2	3 1/2.....	16 1/2	27
2 1/2.....	42 1/2	20 1/2	4.....	38 1/2	17
3.....	42 1/2	21 1/2	4 1/2.....	41 1/2	10 1/2
3 1/2.....	42 1/2	20 1/2	5.....	35	13
3 3/4.....	42 1/2	21 1/2	5 1/2.....	41 1/2	20
4.....	42 1/2	20 1/2	6.....	38 1/2	16 1/2
4 1/2.....	46 1/2	24 1/2	6 1/2.....	43 1/2	22
5 & 6.....	42 1/2	20 1/2	7.....	38 1/2	16 1/2
	44 1/2	22 1/2	7 1/2.....	43 1/2	22
7.....	44 1/2	22 1/2	8.....	43 1/2	20 1/2

Line Steel Pipe: Mill prices in carlots to consumers about \$200 a net ton.

In.	Bk.	Gal.	Butt Weld In.	Bk.	Gal.
1/8.....	40 1/2	5 1/2	1.....	46	25
1/4.....	38 1/2	12 1/2	1 1/8.....	48 1/2	27 1/2
3/8.....	35	9 1/2	1 1/4.....	46 1/2	25 1/2
1/2.....	40	18 1/2	1 1/2.....	48 1/2	27 1/2
3/4.....	42	19 1/2	2.....	47	28 1/2
1.....	43	22 1/2	2 1/4.....	49	28
	45	23 1/2	2 1/2 & 3.....	47 1/2	27
1 1/8.....	45 1/2	25 1/2	2 3/4.....	49 1/2	28 1/2
	47 1/2	26 1/2	3.....	43 1/2	22 1/2
In.	Bk.	Gal.	Elec. Weld In.	Bk.	Gal.
2.....	38 1/2	16 1/2	3 1/2.....	15 1/2	26
2 1/2.....	42 1/2	20 1/2	4.....	37 1/2	16
3.....	42 1/2	20 1/2	4 1/2.....	34 1/2	12
3 1/2.....	41 1/2	20	5.....	40 1/2	19
3 3/4.....	41 1/2	20 1/2	5 1/2.....	37 1/2	15 1/2
4.....	45 1/2	23 1/2	6.....	42 1/2	21
5 & 6.....	41 1/2	20	6 1/2.....	37 1/2	15 1/2
	43 1/2	22 1/2	7.....	42 1/2	21
8.....	45 1/2	24 1/2	7 1/2.....	40 1/2	17 1/2
	45	24	8.....	42 1/2	22
10.....	45	24	9.....	41 1/2	18 1/2
	45	24	10.....	41 1/2	18 1/2
12.....	44	23	11.....	40 1/2	17 1/2
	44	23	12.....	40 1/2	17 1/2

Standard Wrought Iron Pipe: Mill price in carlots, threaded and coupled, to consumers about \$200 a net ton.

In.	Bk.	Gal.	Butt Weld In.	Bk.	Gal.
1/8.....	59 1/2	95 1/2	1 1/8.....	22	53
1/4.....	20 1/2	52 1/2	1 1/4.....	15 1/2	45
3/8.....	10 1/2	41 1/2	2.....	7 1/2	36 1/2
1 and 1 1/8.....	4 1/2	32 1/2	2 1/2-3 1/2.....	5	32
1 1/4.....	1 1/2	29	4.....	List	26
2.....	2	28 1/2	4 1/2-8	2	27 1/2
	2	28 1/2	9-12	12	37

Roller Tubes: Net base c.l. prices, dollars per 100', mill; minimum wall thickness, cut length 4 to 24", inclusive.

O.D. B.W.	H.R.	C.D.	H.R. C.D.
1 1/8	13.39	14.64	13.00
1 1/4	15.87	17.34	13.21
1 1/2	17.71	19.35	14.50
1 3/4	20.15	22.02	16.60
2	22.56	24.66	18.60
2 1/4	25.16	27.50	20.73
2 1/2	27.70	30.28	22.83
2 3/4	30.33	33.15	25.02
3	32.14	35.13	26.51
3 1/2	33.76	36.90	27.82
3 3/4	35.39	38.50	29.39
4	38.50	42.20	31.78
4 1/4	41.51	46.65	35.27
4 1/2	44.51	50.65	38.82
4 3/4	47.51	54.65	42.37
5	50.51	58.65	45.92
5 1/4	53.51	62.65	49.47
5 1/2	56.51	66.65	53.02
5 3/4	59.51	70.65	56.57
6	62.51	74.65	60.12
6 1/4	65.51	78.65	63.67
6 1/2	68.51	82.65	67.22
6 3/4	71.51	86.65	70.77
7	74.51	90.65	74.32
7 1/4	77.51	94.65	77.87
7 1/2	80.51	98.65	81.42
7 3/4	83.51	102.65	84.97
8	86.51	106.65	88.52
8 1/4	89.51	110.65	92.07
8 1/2	92.51	114.65	95.62
8 3/4	95.51	118.65	99.17
9	98.51	122.65	102.72
9 1/4	101.51	126.65	106.27
9 1/2	104.51	130.65	109.82
9 3/4	107.51	134.65	113.37
10	110.51	138.65	116.92
10 1/4	113.51	142.65	120.47
10 1/2	116.51	146.65	124.02
10 3/4	119.51	150.65	127.57
11	122.51	154.65	131.12
11 1/4	125.51	158.65	134.67
11 1/2	128.51	162.65	138.22
11 3/4	131.51	166.65	141.77
12	134.51	170.65	145.32
12 1/4	137.51	174.65	148.

RAW MATERIAL AND FUEL PRICES

Minimum delivered prices do not include 3 per cent federal tax.

Pig Iron

	Per gross Ton			
	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa., furnace	\$48.00	\$48.50	\$49.00	\$49.50
Newark, N. J., del.	50.5334	51.0334	51.5334	52.0334
Brooklyn, N. Y., del.		52.634	53.134	53.634
Philadelphia, del.	50.3002	50.8002	51.3002	51.8002
Birmingham, furnace	42.88	43.38	43.88	44.38
Cincinnati, del.		49.43	49.93	50.43
Buffalo, furnace	47.00	47.00	47.50	48.00
Boston, del.	56.20	56.20	56.70	57.20
Rochester, del.	49.35	49.35	49.85	50.35
Syracuse, del.	50.2065	50.2065	50.7065	51.2065
Chicago, district furnaces ..	46.00	46.00-46.50	46.50	47.00
Milwaukee, del.	47.82	47.82-48.32	48.32	48.82
Muskegon, Mich., del.		51.23-51.78	51.78	52.28
Cleveland, furnace	46.00	46.50	46.50	47.00
Akron, del.	48.3002	48.8002	48.8002	49.3002
Lone Star, Tex., furnace		47.50	48.00	48.50
Duluth, furnace		46.50	46.50	47.00
Erie, Pa., furnace	46.00	46.50	46.50	47.00
Everett, Mass., furnace		52.75	53.25	53.75
Geneva, Utah, furnace	46.00	46.50	47.00	47.50
Seattle, Tacoma, Wash., del.		54.0578	54.5578	55.0578
Portland, Oreg., del.		54.0578	54.5578	55.0578
Los Angeles, San Francisco	53.5578			
Granite City, Ill., furnace ...	47.90	48.40	48.90	49.40
St. Louis, del.	49.40	49.90	50.40	50.90
Ironton, Utah, furnace		46.50	47.00	47.50
Neville Island, Pa., furnace ...	46.00	46.50	46.50	47.00
Pittsburgh, del., N.&S. Sides	47.08	47.58	47.58	48.08
Pittsburgh (Carnegie), furnaces	46.00			47.00
Sharpsville, Pa., furnace	46.00	46.50	46.50	47.00
Steelton, Pa., furnace	48.00	48.50	49.00	49.50
Struthers, O., furnace	42.50			
Swedeland, Pa., furnace	50.00	50.50	51.00	51.50
Toledo, O., furnace	46.00	46.50	46.50	47.00
Cincinnati, del.	50.8230	51.3230		
Youngstown, O., furnace	46.00	46.50	46.50	47.00
Mansfield, O., del.	50.1022	50.6022	50.6022	51.1022

† Low phosphorus southern grade.

‡ To Neville Island base add: \$0.86 for McKees Rocks, Pa.; \$1.31 Lawrenceville, Homestead, McKeesport, Monaca; \$1.73 Verona; \$1.94 Brackenridge; \$1.08 for Ambridge and Aliquippa.

§ Includes, in addition to Chicago, South Chicago, Ill., East Chicago, Gary and Indiana Harbor, Ind.

Blast Furnace Silvery Pig Iron

6.00-6.50 per cent Si (base) ..	\$59.50
6.51-7.00 ..	60.75
7.01-7.50 ..	62.00
7.51-8.00 ..	63.25
8.01-8.50 ..	64.50
8.51-9.00 ..	65.75
F.O.B. Jackson, O., per gross ton	
Buffalo furnace \$1.25 higher.	

Bessemer Ferrosilicon

Prices same as for blast furnace silvery iron, plus \$1 per gross ton.

Electric Furnace Silvery Pig Iron

Si 14.01-14.50%, \$84.75 furnace, Niagara Falls; \$84 open-hearth and \$85 foundry grade, Keokuk, Iowa. Piglets, Si 16%, \$91, Keokuk, Iowa. Add \$1 a ton for each additional 0.5% Si to 15%; \$1 for each 0.5% Mn over 1%; \$1 a ton for 0.45% max. P.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. F.O.B. furnace, Lyles, Tenn., \$66 (For higher silicon iron a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Low Phosphorus

Steelton, Pa., \$54; Buffalo, Troy, N. Y., \$50; Philadelphia, \$56.9786 delivered.

Intermediate phosphorus, Central furnace, Cleveland, \$51.

Electrodes

(Threaded, with nipples, unboxed)

—Inches— Cents per lb.
Diam. Length f.o.b. plant

		Graphite	
17, 18, 20	60, 72	16.00	
8 to 16	48, 60, 72	16.50	
7	48, 60	17.75	
8	48, 60	19.00	
4, 5 1/2	40	19.50	
3	40	20.50	
2 1/2	24, 30	21.00	
2	24, 30	23.00	
		Carbon	
35	100, 110	7.50	
40	100, 110	7.50	
30	84, 110	7.50	
24	72 to 104	7.50	
17 to 20	84, 90	7.50	
14	60, 72	8.00	
10, 12	60	8.25	
8	60	8.50	

Fluorspar

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF₂ content, 70% or more, \$37; less than 60%, \$34.

Metallurgical Coke

	Price per Net Ton
Beehive Ovens	
Connellsville, furnace ..	\$13.50-15.50
Connellsville, foundry ..	16.00-18.00
New River, foundry ..	16.50
Wise county, foundry ..	15.35
Wise county, furnace ..	14.60
Oven Foundry Coke	
Kearney, N. J., ovens ..	\$22.00
Everett, Mass., ovens ..	
New England, del.† ..	23.35
Chicago, ovens ..	20.40
Chicago, del.	21.85
Detroit, del.	24.18
Terre Haute, ovens ..	21.00
Milwaukee, ovens ..	21.15
Indianapolis, ovens ..	20.85
Chicago, del.	24.19
Cincinnati, del.	23.66
Detroit, del.	24.61
Ironton, O., ovens ..	19.40
Cincinnati, del.	21.63
Painesville, O., ovens ..	20.90
Buffalo, del.	23.42
Cleveland, del.	22.55
Erie, del.	22.70
Birmingham, ovens ..	17.70
Philadelphia, ovens ..	21.05
Swedeland, Pa., ovens ..	21.00
Portsmouth, O., ovens ..	19.50
Detroit, ovens ..	20.65
Detroit, del.	*21.70
Buffalo, del.	22.75
Flint, del.	22.98
Pontiac, del.	21.98
Saginaw, del.	23.30

Includes representative switching charge of: \$, \$1.05; †, \$1.45. ‡ Or within \$4.03 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens	
(Price effective as of Aug. 5)	
Pure benzol ..	20.00
Toluol, one degree ..	20.50-26.50
Toluol, two degrees ..	23.00-26.50
Industrial xylol ..	20.50-26.50
Per ton bulk, ovens	
Sulphate of ammonia ..	\$45.00
Per pound, ovens	
(Effective as of Oct. 1)	
Phenol, 40 (carlots, re-	
turnable drums) ..	13.50
Do., less than carlots ..	14.25
Do., tank cars ..	12.50
(Effective as of Oct. 25)	
Naphthalene flakes, ..	
balls, bbl to jobbers, ..	
"household use" ..	13.75

Refractories

(Prices per 1000 brick, f.o.b. plant)

Fire Clay Brick	
Super Duty: St. Louis, Vandalia, ..	
or Farber, Mo., Olive Hill, Ky., ..	
Clearfield, or Curwensville, Pa., ..	
Ottawa, Ill., \$100.	
High-Heat Duty: Salina, Pa., \$85; ..	
Woodbridge, N. J., St. Louis, ..	
Farber, or Vandalia, Mo., West ..	
Decatur, Orviston, Clearfield, ..	
Beach Creek, or Curwensville, ..	
Pa., Olive Hill, Hitchins, Halde- ..	
man, or Ashland, Ky., Troup, or ..	
Athens, Tex., Stevens Pottery, ..	
Ca., Portsmouth, or Oak Hill, O., ..	
Ottawa, Ill., \$80.	
Intermediate-Heat Duty: St. Louis, ..	
or Vandalia, Mo., West Decatur, ..	
Orviston, Beach Creek, or Clear- ..	
field, Pa., Olive Hill, Hitchins, ..	
or Haldeman, Ky., Athens, or ..	
Troup, Tex., Stevens Pottery, Ca., ..	
Portsmouth, O., Ottawa, Ill., \$74.	
Low-Heat Duty: Oak Hill, or Ports- ..	
mouth, O., Clearfield, Pa., Bes- ..	
semer, Ala., Ottawa, Ill., \$66.	
Ladle Brick	
Dry Press: \$55, Freeport, Merrill ..	
Station, Clearfield, Pa.; Chester, ..	
New Cumberland, W. Va.; Iron- ..	
dale, Wellsville, O.	
Wire Cut: \$53, Chester, New Cum- ..	
berland, W. Va.; Wellsville, O.	
Malleable Bung Brick	
St. Louis, Mo., Olive Hill, Ky., ..	
Ottawa, Ill., \$90; Beach Creek, ..	
Pa., \$80.	
Silica Brick	
Mt. Union, Claysburg, or Sprout, ..	
Pa., Ensley, Ala., \$80; Hays, Pa., ..	
\$85; Joliet or Rockdale, Ill., E.	

Chicago, Ind., \$89; Lehi, Uta
Los Angeles, \$95.

Eastern Silica Coke Oven Shap-
Claysburg, Mt. Union, Spro
Pa., Birmingham, \$80.
Illinois Silica Coke Oven Shap-
Joliet or Rockdale, Ill., E. C
cago, Ind., Hays, Pa., \$81.

Basic Brick

(Base prices per net ton; f.o.
works, Baltimore or Chester, P.
Chrome brick or chemical-bond
chrome brick, \$69, magnes
brick, \$91, chemical-bonded ma
nesite, \$80.

Magnesite

(Base prices per net ton, f.o.
works, Chewelah, Wash.)
Domestic dead-burned, %" grain
Bulk, \$30.50-31.00; single pag
bags, \$35.00-35.50.

Dolomite

(Base prices per net ton)
Domestic, dead-burned bulk: B
meyer, Blue Bell, Williams, P
mouth Meeting, Pa., Milville,
Va., Nario, Millersville, Mart
Gibonsburg, Woodville, O., \$12.
Thornton, McCook, Ill., \$12.
Dolly Siding, Bonne Terre, M
\$12.45.

Ores

Lake Superior Iron Ore

Gross ton, 51 1/2% (natural)

Lower Lake Ports

(Any increase or decrease in R.
freight rates, dock handling charge
and taxes thereon effective aft
Dec. 31, 1945, are for buyer's a
count.)

Old range bessemer	\$7.
Old range nonbessemer	7.
Mesabi bessemer	7.
Mesabi nonbessemer	7.
High phosphorus	7.

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56.62%
concentrates, contract 16.

Foreign Ore

Cents per unit, c.i.f. Atlantic po
Swedish basic, 60 to 68% .. 15.
Brazil iron ore, 68-69% 19.

Tungsten Ore

Wolframite and scheelite
per short ton unit, duty
paid \$26-\$ |

Manganese Ore

48-50%, duty paid, f.o.b. cars, N.
York, Philadelphia, Baltimore, N
folk, Va., Mobile, Ala., New C
leans, 67.60c-72.60c.

Chrome Ore

Gross ton f.o.b. cars, New Yor
Philadelphia, Baltimore, Charle
ton, S.C., plus ocean freight ad
ferential for delivery to Portlan
Oreg., and/or Tacoma, Wash.
(8 S paying for discharge; al
basis, subject to penalties
guarantees are not met.)

Indian and African	
48% 2.8:1	\$37.
48% 3:1	39.
48% no ratio	31.

South African (Transvaal)	
44% no ratio	\$25.50-\$26.
45% no ratio	26.
48% no ratio	29.00-30.
50% no ratio	29.50-30.

Brazilian—nominal
44% 2.5:1 lump \$33. |

Rhodesian	
45% no ratio	\$27-\$27.
48% no ratio	30.
48% 3:1 lump	39.
Domestic (seller's nearest rail)	
48% 3:1	\$39.

Molybdenum

Sulphide conc., lb. Mo., cont.,
Mines \$0. |

WAREHOUSE STEEL PRICES

Prices, cents per pound, for delivery within switching limits, subject to extras.

	SHEETS			STRIP		BARS		Standard Structural Shapes		PLATES	
	H-R 10 Ga.	C-R 17 Ga.	Gal. *10 Ga.	H-R	C-R	H-R Rds. %" to 3"	C-F Rds. %" & up	H-R Alloy **4140		Carbon %"-%"	Floor %" & Thicker
ston (city) . .	5.84	6.64	7.84	6.04	6.90	5.69	6.39	8.24-9.74	5.54	5.89	7.34
ston (c'try) . .	5.69	6.49	7.69	5.89	6.75	5.54	6.24	8.09-9.59	5.39	5.74	7.19
w York (city) 5.73-5.80	6.73	7.74-7.83	6.08-6.28	...	5.73	6.58	8.67	5.52-5.78	5.98	7.48	
w York (c'try) 5.83-5.60	6.53	7.54-7.63	5.88-6.08	...	5.53	6.38	...	5.32-5.58	5.78	7.28	
lla. (city) . .	5.72	6.64	7.53-7.58	5.60	...	5.55	6.34	8.40	5.25	5.53	6.74
lla. (c'try) . .	5.57	6.59	7.38-7.43	5.45	...	5.40	6.19	8.25	5.10	5.38	6.59
lt. (city) . . .	5.46†	6.36	7.26	5.52	...	5.57	6.31	...	5.51	5.71	7.16
lt. (c'try) . . .	5.31†	6.21	7.11	5.37	...	5.42	6.16	...	5.36	5.56	7.01
orfolk, Va. . .	5.80	...	...	...	...	6.05	7.05	...	6.05	6.05	7.55
ash. (w'hse) . .	5.84-6.00	...	...	5.90	...	5.91-5.95	6.61	...	5.85-5.89	6.05-6.09	7.50-7.54
iffalo (del.) . .	5.90	5.90	7.85	5.49	6.50	5.20	6.05	10.13	5.25	5.50	7.06
iffalo (w'hse) . .	4.85	5.75	7.70	5.34	6.35	5.05	5.90	9.98	5.10	5.35	6.91
ts. (w'hse) . .	4.85-5.00§	5.75-5.85§	7.15-7.70	5.00-5.35	5.95-6.00	4.90-5.10	5.65	7.65	4.90-5.15	5.05-5.25	6.55
etroit (w'hse) 4.85-5.00§	5.75-5.85§	7.15	5.00-5.35	5.95-6.00	5.45	6.17	8.12	5.45	5.65-5.80	7.10	
evland (del.) 5.13-5.90††	5.90-6.11	7.35-8.10††	5.18-5.31	6.60-6.85	5.32-5.36	6.05-6.12	8.24-8.56	5.35-5.62	5.52-5.56	6.95-7.01	
eve. (w'hse) 4.98-5.75	5.75-6.16	7.20-7.95	5.03-5.16	6.70	5.17-5.21	5.90-5.97	8.24-9.41	5.21-5.47	5.37-5.41	6.80-6.86	
ncin. (w'hse) . .	5.29	6.14	7.63	5.55	6.10	5.55	6.10	...	5.40	5.64	6.94
icago (city) . .	5.20	5.90§	7.30	5.00	6.67-6.80	5.05	5.85	8.25*	5.05	5.25	6.70
icago (w'hse) 4.85-5.05	5.75§	7.15	4.85	6.52-6.65	4.90	5.70	8.10*	4.90	5.10	6.55	
ilwaukee (city) . .	5.38	6.08§	7.48	5.18	6.82-6.98	5.23	6.03	8.43*	5.23	5.43	6.88
l. Louis (del.) . .	5.34§	6.24§	7.44	5.34	6.64	5.39	6.19 ¹²	6.64	5.39	5.59	7.04
l. L. (w'hse) . .	5.19§	6.09§	7.29	5.19	6.49	5.24	6.04 ¹²	9.49	5.24	5.44	6.89
rm'ham (city) . .	5.20§	...	6.60	5.20	...	5.15	6.66-6.83	...	5.15	5.40	7.41-7.73 ²⁰
rm'ham (c'try) . .	5.08§	...	6.45	5.05	...	5.00	6.51-6.68	...	5.00	5.25	7.26-7.58 ²⁰
maha, Nebr. . .	6.07	...	9.33	6.07	...	6.12	6.92	...	6.12	6.32	7.77
os Ang. (city) . .	6.55§	8.05	8.20†	6.75	9.50	6.20	8.00-8.50	...	6.70	6.40	8.15
an A. (w'hse) . .	6.40§	7.90	8.05†	6.60	9.35	6.05	7.85-8.35	...	6.55	6.25	8.00
an Francisco . .	5.95 ²¹	7.15	8.05	6.75 ²¹	8.25 ¹⁸	5.90 ²¹	7.55	10.20††	5.90	7.60	8.10
eattle-Tacoma . .	6.35 ¹⁷	7.90 ⁶	8.40	6.70 ¹⁷	...	6.20 ¹⁷	8.15 ¹	9.45 ²	6.30 ¹⁷	6.35 ¹⁷	8.40 ¹⁷

Base Quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold finished bars, 1000 lb and over; galvanized sheets, 450 to 499 lb; 1—1500 lb and over; 2—1000 to 4999 lb; 3—450 to 39,999 lb; 4—three to 24 bundles; 5—450 to 14,999 lb; 6—400 to 14,999 lb; 7—1000 to 1999 lb; 8—1000 to 39,999 lb; 9—1000 to 1999 lb; 10—1000 to 39,999 lb; 11—1000 to 1999 lb; 12—1000 lb and over; 13—2000 lb and over; 14—300 to 999 lb; 15—1500 to 1999 lb; 16—1500 to 39,999 lb; 17—400 to 1999 lb; 18—400 lb and over; 19—500 to 1499 lb; 20—Price (but not other price in range) applies to any and all quantities.

* Includes gage and coating extra, except Birmingham (coating extra excluded); † does not include gage extras; ‡ 15 gage; § 18 gage and heavier; †† as rolled; ††† add 0.40 for sizes not rolled in Birmingham; †† top level of quoted range is nominal.

Bolts, Nuts

Prices to consumers, f.o.b. midwestern plants. Sellers reserve right to meet competitors' prices, if lower. Additional discounts on carriage and machine bolts. 5 for carloads; 15 for full containers, except tire and plow bolts.

Carriage and Machine Bolts

1/2-in. and smaller; up to 6 in. in length	35 off
3/4-in. and 1/2 x 6-in. and shorter	37 off
1-in. and larger x 6-in. and shorter	34 off
All diameters longer than 6-in.	30 off
Fire bolts	25 off
Plow bolts	47 off
Lag bolts, 6 in. and shorter	37 off
Lag bolts, longer than 6 in.	35 off

Stove Bolts

In packages, nuts separate, 58 1/2-10 off; bulk 70 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

Nuts

	A.S. f.o.b.	A.S. Reg. and Heavy
Semifinished hexagon	Light	41 off
1/2-in. and smaller	38 off	...
3/4-in. and smaller	39 off	...
1-in. and smaller	37 off	...
1 1/4-in. and smaller	37 off	...
1 1/2-in. and smaller	34 off	28 off
1-in. and larger	34 off	28 off

Additional discount of 15 for full containers.

Hexagon Cap Screws (Packaged)

Upset 1-in. smaller by 6-in. and shorter (1020 bright)	46 off
Upset (1035 heat treated)	...
1/2 and smaller x 6 and shorter	40 off
3/4, 1, and 1 x 6-in. and shorter	35 off

Square Head Set Screws

Upset 1-in. and smaller	51 off
Headless, 1/2-in. and larger	31 off

Rivets

F.o.b. midwestern plants

Structural 1/2-in. and larger	6.75c
1/4-in. and under	48 off

Washers, Wrought

F.o.b. shipping point, to jobbers. Net to \$1 off

FERROALLOY PRODUCT PRICES

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si) Carlot per gross ton, \$62, Palmerton, Pa.; \$66, Pittsburgh and Chicago; (16% to 19% Mn) \$1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk \$160 per gross ton of alloy, c.l., packed, \$172; gross ton lots, packed, \$187; less gross ton lots, packed, \$204; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., or Weiland, Ont. Base price: \$165, Rockwood, Tenn.; \$162, f.o.b. Birmingham and Johnstown, Pa., furnaces; \$160, Sheridan, Pa.; \$163, Etna, Pa. Shipment from Pacific Coast warehouses by one seller add \$31 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouses, ton lots, \$201; less gross ton lots, \$218 f.o.b. Chicago. Add or subtract \$2 for each 1%, or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 25.5c, ton lot 26.6c, less ton 27.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 0.75% C—max. 7% Si. Special Grade: (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c. Delivered. Spot, add 0.25c.

Manganese Metal: (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Carload, 2" x D, packed 35.5c per lb of metal, ton lot 37c, less ton 39c. Delivered. Spot, add 2c.

Manganese, Electrolytic: Less than 250 lb, 35c; 250 lb to 1999 lb, 32c; 2000 to 35,999 lb, 30c; 36,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound. F.o.b. cars Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 8.6c per lb of alloy, carload packed, 9.35c, ton lot 10.25c, less ton 11.25c. Freight allowed. For 2% C grade, Si 15-17.5%, deduct 0.2c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 20.5c per lb of contained Cr, c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Contract, c.l., 8MxD, bulk 22.0c per lb of contained Cr, c.l., packed 22.9c, ton 24.5c, less ton 26.0c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max. 0.02% C 31.8c per lb of contained Cr, 0.04% C 29.75c, 0.06% C 28.75c, 0.10% C 28.25c-29.5c, 0.15% C 28.0c, 0.20% C 27.75c, 0.50% C 27.5c, 1% C 27.25c, 1.50% C 27.1c, 2% C 27.0c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, C 0.75-1.25% max.). Contract, carload, lump, bulk 27.75c per lb of contained chromium, carload, packed 28.85c, ton lot 30.05c, less ton 31.85c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 5c for each 0.25% of N above 0.75%.

Chromium Metal: (Min. 97% Cr and 1% Fe). Contract, carload, 1" x D, packed, max. 0.50% C grade, \$1.03 per lb of contained chromium, ton lot \$1.05, less ton \$1.07. Delivered. Spot, add 5c.

(Please turn to Page 162)

Secondary Metal Prices Decline

Brass and bronze ingot, remelt aluminum and scrap metal prices move lower as buying interest tapers. Major primary metal prices continue firm, but buying pressure eases

New York — Remelt aluminum, brass and bronze ingot and scrap metal prices declined further last week. Weakness in the secondary ingot market was attributed to the dearth in new business, plus heavy flow of scrap. While inventories of scrap have increased substantially in recent weeks, demand for ingot has declined. Major primary metal markets, however, continued firm.

Copper — Operations at the Utah properties of Kennecott Copper Corp. were resumed last week following settlement of the 104-day old strike, but they will not reach a normal rate until early in March. It is estimated that industry will be deprived of between 75,000 and 85,000 tons as a direct result of this shutdown.

Secondary Copper — Copper refineries further reduced their scrap buying prices by \$5 a ton last week to the following levels in cents per pound: No. 1 heavy copper and wire, 19.75; No. 2 copper wire, 18.75; light copper, 17.75; automobile radiators, 13.00; and refinery brass, 18.00, delivered to refinery within 30 days. These prices for scrap by refiners are the lowest since July, 1948, prior to the advance in electrolytic copper to 23.50c from 21.50c, Valley.

Leading brass and bronze ingot makers have cut their prices 1/2-cent to 1 cent a pound on several grades. In the 85-5-5-5 group, three items were reduced 1/2-cent a pound; all remaining alloys, 1 cent. In the 88-10-2 group, 1/2-cent of the alloys were marked down 1/2-cent to 1 cent a pound; all remaining alloys, unchanged. In the 80-10-10 group, all alloys were reduced 1 cent a pound with the exception of ingot No. 314 which held unchanged. In the yellow ingot group, prices remained unchanged, while all of the nickel alloys were reduced 1/2-cent a pound. No changes were made in the aluminum and manganese bronzes.

Remelt Aluminum — Reflecting the steady flow of scrap aluminum to smelters and the decline in new bookings by the latter, secondary aluminum ingot prices were reduced last week. No. 12 aluminum, No. 2 grade, is now quoted 23.25c to 23.75c; piston alloys, 6-6 type, 23.50c to 24.50c; steel deoxidizing grades No. 1, 25.00c to 25.75c; grade 2, 24.00c to 24.50c; grade 3, 23.25c to 23.50c; and grade 3, 22.50c to 22.75c.

Aluminum — Output of primary aluminum totaled only 50,714 net tons in November, the smallest since June, according to the Bureau of Mines. Stocks of aluminum at reduction plants dropped to only 8075 tons at the end of November, a decline of 21 per cent from the Oct. 31 total.

Lead — Producers opened books last week for delivery of lead in March and noted absence of the usual rush by consumers to cover their needs. Although supplies probably will not be so large for that month

as they are for the current period, some consumers are covering for only a few weeks forward. Receipts of lead in ore and scrap totaled 506,859 tons in 1948, a decline of some 18,300 tons from the preceding year.

Zinc — Stocks of slab zinc at the end of January totaled 26,038 tons compared with 20,848 tons at the end of December, while production totaled 75,815 tons last month compared with 76,696 tons in December. Shipments, aggregating 70,625 tons in January, consisted of 62,614 tons to domestic users, 5857 tons for exports and drawback, and 2154 tons for government account. Unfilled orders increased to 75,858 tons as of Jan. 31

MARKETING GALLIUM

Pittsburgh — Aluminum Co. of America is now producing and offering for sale metallic gallium in limited quantities. This rare, silvery-white metal is being derived from bauxite which contains only about one ounce of gallium per ton of ore. Separation and recovery of such minute quantities is a difficult and expensive task.

Gallium has the following unique properties: It is liquid on a warm summer day, but will not boil until heated to about 3700° F; its density (5.9) is about twice that of aluminum, but only about half that of mercury; its density is greater as a liquid than as a solid.

from 51,318 tons at the end of 1948, but the January backlog included a substantial tonnage which was tied up in strike-bound plants.

Tin — World mine production of tin increased to 14,200 tons in November, according to the International Tin Study Group. During the previous months in 1948, output had ranged from 12,000 to 13,400 tons. Total for the year is provisionally estimated at 152,500 tons while world consumption is estimated at 138,000 tons. Shipments of Straits tin in January amounted to 5844 tons, of which 4139 tons were shipped from Penang and 1705 tons from Singapore.

Strategic Bauxite Deposits

Louisville, Ky. — Immense deposits of a new type of high-quality bauxite discovered on the islands of Jamaica, Haiti, and Hispaniola in the Caribbean will prove of untold value to any defense program the United States may adopt, says O. C. Schmedeman, vice president and chief geologist, Reynolds Mining Corp., Little Rock, Ark., a subsidiary

of Reynolds Metals Co.

These discoveries are particularly significant in view of the virtual exhaustion of high-grade bauxite reserves in the United States, the fourfold expansion of the industry during the past seven years, and the general inadequacy of the Guiana reserves. They are certain to involve major reorientation of structure, distribution, control and practices of the aluminum industry. Their abundance and their ease of mining and shipping may well prove equally decisive from a military standpoint in future emergency.

The high-grade reserves drilled and sampled to date total at least 30 million tons of which 90 per cent more is in Jamaica and the remainder divided between Haiti and the Dominican Republic. In both Haiti and Jamaica the average alumina (aluminum oxide) content of all or drilled and sampled by Reynolds is practically an even 50 per cent. The average is appreciably less than most high-grade ores, which generally contain from 54 to 60 per cent alumina. Although the alumina content of the Caribbean ores is relatively low, it is largely offset by a usually small percentage of silica. The average silica content is in the neighborhood of 2 per cent or less. Deposits averaging more than 5 per cent silica are uncommon, and large ore bodies of the order of a million tons or more contain less than 0.75 per cent silica. The usual high-grade ore used in North America contains 3 to 7 per cent silica, and the low grade Arkansas ores now use contain 10 to 20 per cent. The low silica content of the Caribbean ore is important because silica lowers the amount of alumina which can be recovered economically and because it combines with and carries away costly reagent, soda ash.

Development of the Caribbean deposits on a large scale offers the best hope of providing necessary future emergency imports. They require no stripping, and capacity can be increased greatly in a matter of days or weeks. Since no deposit is more than 15 miles from the seacoast, it can be transported to the shore in any desired volume by reliable methods, and loaded directly into the largest carriers at deep-water ports.

Magnesium Shipments Rise

Washington — Total shipments of magnesium wrought products during 1948 amounted to 5.9 million pounds, 22 per cent above the 4.8 million pounds shipped during 1947, according to the Census Bureau.

Shipments of magnesium wrought products followed a general upward trend during the year, a continuation of the trend which started immediately after September, 1947, when shipments of these products were at their lowest.

Shipments during December totaled 728,000 pounds, 37 per cent higher than the 532,000 pounds shipped in November, and more than 2½ times the 275,000 pounds shipped in December, 1947. The December shipments were the highest monthly shipments since February, 1947, when they amounted to 752,000 pounds.

NONFERROUS METAL PRICES

(Cents per pound, carlots, except as otherwise noted)

Copper: Electrolytic, 23.50c, Conn. Valley; Lake, 23.62½c, Conn. Valley.

Brass Ingot: 85-5-5-5 (No. 115) 19.50-21.00c; 88-10-2 (No. 215) 30.50c; 80-10-10 (No. 305) 26.25c; No. 1 yellow (No. 405) 17.00-17.50c.

Zinc: Prime western 17.50c, brass special 17.75c, intermediate 18.00c, East St. Louis; high grade 18.50c, delivered.

Lead: Common 21.30-21.35c, chemical and corroding 21.40c, St. Louis.

Primary Aluminum: 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, f.o.b. shipping point.

Secondary Aluminum: Piston alloy (6-6 type) 23.50-24.50c; No. 12 foundry alloy (No. 2 grade) 23.25-23.75c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 25.00-25.75c; grade 2, 24.00-24.50c; grade 3, 23.25-23.50c; grade 4, 22.50-22.75c. Prices include freight at carload rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb. and over, 20.50c, f.o.b. Freeport, Tex.

Tin: Grade A, 99.8% or higher (including Straits) \$1.03; grade B, 99.8% or higher, not meeting specifications for grade A, with 0.05% max. arsenic, \$1.023; grade G, 99.65-99.79%, incl., \$1.024; 99.5-99.64% \$1.024, grade F, 98-98.99% \$1.015 for tin content. Prices are ex-dock, New York, in 5-ton lots.

Antimony: American 99-99.8% and over but not meeting specifications below, 38.50c; 99.8% and over (arsenic 0.05% max.; other impurities, 0.1% max.) 39.00c, f.o.b. Laredo, Tex., for bulk shipments.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.50c; shot nom.; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 40.50c. Prices include import duty.

Mercury: Open market, spot, New York \$88-\$94 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, \$24.50 per lb contained Be.

Cadmium: "Regular" straight or flat forms, \$2 del.; special or patented shapes, \$2.10.

Cobalt: 97-98%, \$1.65 per lb for 550 lb (keg); \$1.67 per lb for 100 lb (case); \$1.72 per lb under 100 lb.

Gold: U. S. Treasury, \$35 per ounce.

Silver: Open market, New York, 70.00c per ounce.

Platinum: \$88-\$91 per ounce.

Palladium: \$24 per troy ounce.

Iridium: \$100-\$105 per troy ounce.

Titanium (sponge form): \$5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill)

Sheet: Copper 37.18; yellow brass 34.59; commercial bronze, 95%, 37.23; 90%, 38.83; red brass, 85%, 36.01; 80%, 35.63; best quality, 35.33; nickel silver, 18%, 46.92; phosphor-bronze, grade A, 5%, 56.05.

Rods: Copper, hot rolled 33.28; cold drawn 34.28; yellow brass, free cutting, 38.16; commercial bronze, 95% 36.92; 90% 36.57; red brass, 85% 35.70; 80% 35.35.

Seamless Tubing: Copper 37.22; yellow brass 37.60; commercial bronze 90% 39.54; red brass 85% 38.92; 80% 38.57.

Wire: Yellow brass 34.88; commercial bronze, 95% 37.52; 90% 37.17; red brass, 85% 36.30; 80% 35.95; best quality brass 35.62.

Copper Wire: Bare, soft, f.o.b. eastern mills, c.l. 29.42½c, l.c.l. 29.92½-30.05c; weather-proof, f.o.b. eastern mills, c.l. 29.60-29.85c, l.c.l. 30.35c; magnet, delivered, c.l. 32.75-33.50c, 15,000 lb or more 33.00-33.75c, l.c.l. 33.50-34.25c.

ALUMINUM

Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle†
0.249-0.136	12-48	26.9	...	...
0.135-0.096	12-48	27.4	...	...
0.095-0.077	12-48	27.9	26.0	29.6
0.076-0.068	12-48	28.5	26.2	29.8
0.067-0.061	12-48	28.5	26.2	29.8
0.060-0.048	12-48	28.7	26.4	30.1
0.047-0.038	12-48	29.1	26.6	30.4
0.037-0.030	12-48	29.5	27.0	30.9
0.029-0.024	12-48	29.9	27.3	31.3
0.023-0.019	12-36	30.5	27.7	31.8
0.018-0.017	12-36	31.1	28.3	32.6
0.016-0.015	12-36	31.8	28.9	33.5
0.014	12-24	32.7	29.7	34.6
0.013-0.012	12-24	33.6	30.4	35.5
0.011	12-24	34.6	31.3	36.7
0.010-0.0095	12-24	35.6	32.3	38.0
0.009-0.0085	12-20	36.8	33.4	39.5
0.008-0.0075	12-20	38.1	34.6	41.1
0.007	12-18	39.5	35.9	42.9
0.006	12-18	41.0	37.2	47.0

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	Round— R37-T4, 17S-T4	Hexagonal— R317-T4, 17S-T4
0.125	48.0	...
0.156-0.203	41.0	...
0.219-0.313	38.0	...
0.344	37.0	47.0
0.375	36.5	44.0
0.406	35.5	...
0.438	35.5	44.0
0.469	36.5	...
0.500	36.5	44.0
0.531	36.5	...
0.563	36.5	41.5
0.594	36.5	...
0.625	36.5	41.5
0.656	36.5	...
0.688	36.5	41.5
0.750-1.000	35.5	40.0
1.063	35.5	37.5
1.125-1.500	34.5	39.0
1.563	34.5	37.5
1.625	33.5	...
1.688-2.000	32.5	...
2.125-2.500	32.5	...
2.625-3.375	31.5	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more, \$27.25 per cwt.; add 50c per cwt., 10 sq ft to 140 sq ft. Pipe: Full coils, \$27.25 per cwt.; cut coils, \$27.50. Traps and Bends: List price plus 70%.

ZINC

Sheets, 22.00-22.50c, f.o.b. mill, 36,000 lb and over. **Ribbon zinc** in coils, 20.75-21.50c, f.o.b. mill, 36,000 lb and over. **Plates,** not over 12-in., 19.75-20.50c; over 12-in., 20.75-21.50c.

NIOBEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled, 80.00c. **Strip,** cold-rolled 66.00c. **Rods and shapes,** 56.00c. **Plates** 58.00c. **Seamless tubes,** 89.00c.

MONEL

(Base prices, f.o.b. mill.)

Sheets, cold-rolled 47.00c; **Strip,** cold-rolled, 50.00c. **Rods and shapes,** 45.00c. **Plates,** 46.00c. **Seamless tubes,** 80.00c. **Shot and blocks,** 40.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb., 35.00-36.00c.

Plating Materials

Chromic Acid: 99.9%, flake, f.o.b. Philadelphia, carloads, 26.00c; 5 tons and over 26.50c; 1 to 5 tons, 27.00c; less than 1 ton, 27.50c.

Copper Anodes: Base, 2000 to 5000 lb; f.o.b. shipping point, freight allowed: Flat untrimmed 33.84c; oval 33.34c; electrodeposited, 31.09c; cast, 30.12c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 46.00c, f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 16.00c; 1000 to 19,900 lb, 15.00c, f.o.b. Niagara Falls, N. Y.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 28.25c; over 250 lb, 25.25c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 100 lb, 64.00c; f.o.b. Cleveland. Add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 26.50c; 275-lb, or 500-lb bbl, 24.50c, f.o.b. Cleveland, freight allowed on barrels, or 3 or more kegs.

Tin Anodes: Bar, 2000 lb and over 119.00c; 500 to 999 lb, 119.50c; 200 to 499 lb, 120.00c; less than 200 lb, 121.50c; ball, 1000 lb and over, 121.25c; 500 to 999 lb, 121.75c; 200 to 499 lb, 122.25c; less than 200 lb, 123.75c f.o.b. Seward, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 71.80c; 100 or 300 lb drums only, 100 to 500 lb, 63.60c; 600 to 1900 lb, 61.20c; 2000 to 9900 lb, 59.4c. Prices f.o.b. Seward, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100-lb drums 39.25c, f.o.b. Cleveland; 39.00c, Detroit; 38.00c, f.o.b. Philadelphia.

Stannous Sulphate: Less than 2000 lb in 100 lb kegs, 100.00c, in 400 lb bbl, 99.00c; more than 2000 lb, in 100 lb kegs, 99.00c, in 400 lb bbl, 98.00c, f.o.b. Carteret, N. J.

Stannous Chloride (anhydrous): In 400 lb bbl, 97.00c; in 100 lb kegs, 98.00c, f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb f.o.b. shipping point.

	Clean	Rod	Clean
Copper	21.125	21.125	20.375
Yellow brass	18.875	18.625	18.125

	Heavy	Ends	Turnings
Commercial Bronze	20.250	20.000	19.500
95%	20.125	19.875	19.375

	85%	80%	Best Quality (71-79%)
Red brass	20.000	19.750	19.250
85%	19.875	19.625	19.125

	Muntz Metal	Nickel, silver, 10%	Phos. bronze, A	Naval brass	Manganese bronze
100%	18.250	18.000	17.500	18.000	18.750
90%	20.250	20.000	10.000	22.625	22.375
80%	18.750	18.500	18.375	18.750	18.500
70%	18.750	18.500	18.375	18.750	18.500

BRASS INGOT MAKERS

BUYING PRICES

(Cents per pound, f.o.b. shipping point, carload lots)

No. 1 copper 19.50, No. 2 copper 18.50, light copper 17.50, composition red brass 14.50-15.00, auto radiators 12.50-12.75, heavy yellow brass 11.50-12.00.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 19.50, No. 2 copper 18.50, light copper 17.75, refinery brass (60% copper), per dry copper content 18.00.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire No. 1 18.25-18.75, No. 2 17.25-17.75, light copper 16.25-16.75, No. 1 composition red brass 13.50-13.75, No. 1 composition turnings 13.00-13.25, mixed brass turnings 8.25-8.50, new brass clippings 15.75-16.25, No. 1 brass rod turnings 11.75-12.25, light brass 7.50-7.75, heavy yellow brass 10.00-10.25, new brass rod ends 12.25-12.75, auto radiators, unswaged 12.00-12.75, cocks and faucets 11.50-11.75, brass pipe 12.00-12.75.

Lead: Heavy 17.00-17.50, battery plates 9.50-10.00, linotype and stereotype 18.50-19.00, electrolyte 17.50-18.00, mixed babbitt 19.00-19.50, solder joints, 23.00-24.00.

Zinc: Old zinc 9.00-9.50, new die cast scrap 9.00-9.50, old die cast scrap 6.00-6.50.

Tin: No. 1 pewter 65.00-67.00, block tin pipe 83.00-84.00, No. 1 babbitt 51.00-54.00, siphon tops 50.00-52.00.

Aluminum: Clippings 23 15.50-16.00, old sheets 10.50-11.00, crankcase 10.50-11.00, borings and turnings 6.00-6.50, pistons, free of struts, 10.50-11.00.

DAILY PRICE RECORD

	Copper	Lead	Zinc	Tin	Aluminum	An-timony	Nickel	Silver
Jan. Avg.	23.50	21.325	17.50	103.00	17.00	38.50	40.00	70.00
Dec. Avg.	23.50	21.325	17.50	103.00	17.00	38.50	40.00	70.00
Nov. Avg.	23.50	21.325	16.580	103.00	17.00	38.50	40.00	73.655
Feb. 1-10	23.50	21.30-21.35	17.50	103.00	17.00	38.50	40.00	70.00

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis, Tin, Straits, del. New York; Aluminum, primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery, unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

PITTSBURGH

No. 1 Hvy. Melt.	\$41.00*
No. 2 Hvy. Melt.	39.00†
No. 1 Busheling.	41.00†
No. 1 Bundles.	38.00-39.00†
No. 2 Bundles.	37.00-38.00†
Machine Shop Turnings	33.50-34.50
Mixed Borings, Turnings	33.50-34.50
Short Shovel Turnings.	35.00-35.50
Cast Iron Borings.	34.50-35.50
Bar Crops and Plate.	45.50-46.50
Low Phos. Steel.	45.00-46.00
Heavy Turnings.	35.50-37.50

Cast Iron Grades

Mixed Yard.	45.00-46.00
No. 1 Machinery Cast.	59.00-60.00
Charging Box Cast.	49.00-50.00
Heavy Breakable Cast.	48.00-49.00
Brake Shoe.	47.00-48.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	42.00
Axles.	51.00-53.50
Rails, Re-rolling.	53.00-54.00
Rails, Random Lengths	50.00-51.00
Rails, 3 ft. and under.	53.00-54.00
Rails, 18 in. and under.	54.00-55.00
Railroad Specialties.	49.00-50.00
Uncut Tires.	52.00-53.00
Angles, Splice Bars.	54.00-55.00

* Represents latest representative mill sale reported. Offer of tonnage at \$37 rejected by mills.
† Nominal.

CLEVELAND

No. 1 Heavy Melt. Steel	\$37.00-37.50
No. 2 Heavy Melt. Steel	37.00-37.50
No. 1 Busheling.	37.00-37.50
No. 2 Bundles.	36.00-36.50
Machine Shop Turnings	28.00-29.00
Mixed Borings, Turnings	30.00-31.00
Short Shovel Turnings	30.00-31.00
Cast Iron Borings.	30.00-31.00
Bar Crops and Plate.	42.00-43.00
Punchings & Plate Scrap	42.00-43.00
Heavy Turnings.	33.00-34.00
Alloy Free Turnings.	32.00-33.00
Cut Structural.	42.00-43.00

Cast Iron Grades

No. 1 Cupola.	55.00-56.00
Charging Box Cast.	50.00-51.00
Stove Plate.	50.00-51.00
Heavy Breakable Cast.	45.00-46.00
Unstripped Motor Blocks	45.00-46.00
Malleable.	60.00-60.50
Brake Shoes.	46.50-47.00
Clean Auto Cast.	60.00-61.00
No. 1 Wheels.	55.00-56.00
Burnt Cast.	46.00-46.50

Railroad Scrap

No. 1 R.R. Heavy Melt	41.50-42.00
R.R. Malleable.	60.00-60.50
Rails, Re-rolling.	58.00-60.00
Rails, Random Lengths	52.00-53.00
Rails, 3 ft. and under.	58.00-60.00
Cast Steel.	51.00-52.00
Railroad Specialties.	51.00-52.00
Uncut Tires.	48.00-50.00
Angles, Splice Bars.	54.00-55.00

VALLEY

No. 1 Heavy Melt. Steel	\$37.50-38.00
No. 2 Heavy Melt. Steel	37.50-38.00
No. 1 Bundles.	37.50-38.00
Machine Shop Turnings	30.00-31.00
Short Shovel Turnings	32.00-33.00
Cast Iron Borings.	32.00-33.00
Low Phos.	45.00-46.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	41.50-42.00
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MANSFIELD

Machine Shop Turnings	\$30.00-31.00
Short Shovel Turnings	32.00-33.00

CINCINNATI

No. 1 Heavy Melt. Steel	\$34.00
No. 2 Heavy Melt. Steel	34.00

No. 1 Busheling.	34.00
Nos. 1 & 2 Bundles.	34.00
Machine Shop Turnings	29.00
Mixed Borings, Turnings	29.00
Short Shovel Turnings.	31.00
Cast Iron Borings.	30.00

Cast Iron Grades

No. 1 Cupola Cast.	50.00
Charging Box Cast.	43.00
Heavy Breakable Cast.	42.00
Stove Plate.	42.00
Unstripped Motor Blocks	40.00
Brake Shoes.	41.00
Clean Auto Cast.	50.00
Drop Broken Cast.	54.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	38.00
R.R. Malleable.	62.00
Rails, Re-rolling.	52.00
Rails, Random Lengths	46.00
Rails, 18 in. and under.	54.00

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 1 Heavy Melt. Steel	\$32.50-33.00
No. 1 Busheling.	32.50-33.00
No. 1 Low-phos.	32.50-33.00
Bundles.	37.50-38.00
No. 2 Bundles.	32.50-33.00
Machine Shop Turnings	26.50-27.00
Mixed Borings, Turnings	26.50-27.00
Short Shovel Turnings.	27.50-28.00
Cast Iron Borings.	30.00-30.50
Punchings & Plate Scrap	39.50-40.00

Cast Iron Grades

No. 1 Cupola Cast.	53.00-55.00
Heavy Breakable Cast.	48.00-50.00
Clean Auto Cast.	53.00-55.00

BUFFALO

No. 1 Heavy Melt. Steel	\$40.00-41.00
No. 2 Heavy Melt. Steel	37.00-38.00
No. 1 Busheling.	37.00-38.00
Nos. 1 & 2 Bundles.	37.00-38.00
Machine Shop Turnings	31.00-31.50
Mixed Borings, Turnings	31.00-31.50
Cast Iron Borings.	32.00-32.50
Short Shovel Turnings.	32.00-32.50
Low Phos.	41.00-41.50

Cast Iron Grades

No. 1 Cupola.	52.00-54.00
Mixed Cupola.	48.00-50.00
Heavy Breakable Cast.	54.00-55.00
Malleable.	65.00-66.00
Clean Auto Cast.	62.00-63.00

Railroad Scrap

Rails, 3 ft. and under.	55.00-56.00
Railroad Specialties.	53.00-54.00

PHILADELPHIA

No. 1 Heavy Melt. Steel	\$39.00-40.00
No. 2 Heavy Melt. Steel	35.00
No. 1 Busheling.	35.00
No. 1 Bundles.	38.00
No. 2 Bundles.	33.00
Machine Shop Turnings	31.00-31.50
Mixed Borings, Turnings	31.00-32.00
Short Shovel Turnings.	34.50-35.50
Bar Crop and Plate.	42.00-43.00
Punchings & Plate Scrap	42.00-43.00
Cut Structural.	42.00-43.00
Elec. Furnace Bundles.	41.00-42.00
Heavy Turnings.	39.00

Cast Iron Grades

No. 1 Cupola Cast.	35.00
No. 1 Machinery Cast.	48.00-49.00
Charging Box Cast.	44.00
Heavy Breakable Cast.	44.00-45.00
Unstripped Motor Blocks	42.00-42.50
Clean Auto Cast.	48.00
No. 1 Wheels.	48.00-49.00
Malleable.	nom.

NEW YORK

(Brokers' buying prices f.o.b. shipping point)

No. 1 Heavy Melt. Steel	\$32.00
No. 2 Heavy Melt. Steel	30.00

No. 1 Busheling.	30.00
No. 1 Bundles.	32.00
No. 2 Bundles.	30.00
No. 3 Bundles.	nom.
Machine Shop Turnings	18.00-20.00
Mixed Borings, Turnings	18.00-20.00
Short Shovel Turnings.	20.00
Punchings & Plate Scrap	35.00-36.00
Cut Structural.	35.00-36.00
Elec. Furnace Bundles.	35.00-36.00

Cast Iron Grades

No. 1 Cupola Cast.	40.00
Charging Box Cast.	40.00
Heavy Breakable.	36.00
Unstripped Motor Blocks	37.00-37.50
Malleable.	nom.

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	\$32.50
No. 2 Heavy Melt. Steel	30.50
No. 1 Bundles.	31.50-32.50
No. 1 Busheling.	30.50
Machine Shop Turnings	24.00-25.00
Mixed Borings, Turnings	24.00-25.00
Short Shovel Turnings.	26.00-27.00
Bar Crops and Plate.	35.00-36.00
Punchings & Plate Scrap	35.00-36.00
Chemical Borings.	32.00-33.00

Cast Iron Grades

No. 1 Cupola Cast.	50.00-52.00
Heavy Breakable Cast.	45.00-46.00
Stove Plate.	40.00-42.00
Unstripped Motor Blocks	38.00-40.00
Clean Auto Cast.	42.00-44.00

CHICAGO

No. 1 Heavy Melt. Steel	\$35.00-37.00
No. 2 Heavy Melt. Steel	32.00-33.00
No. 1 Bundles.	35.00-37.00
No. 2 Bundles.	30.00-33.00
No. 3 Bundles.	30.00-35.00
Machine Shop Turnings	24.00-25.00
Mixed Borings, Turnings	24.00-25.00
Short Shovel Turnings.	27.00-28.00
Cast Iron Borings.	26.00-27.00
Bar Crops and Plate.	38.00-40.00
Punchings.	38.00-39.00
Elec. Furnace Bundles.	38.50-39.50
Heavy Turnings.	34.00-35.00
Cut Structural.	38.00-39.00

Cast Iron Grades

No. 1 Cupola Cast.	43.00-45.00
Clean Auto Cast.	43.00-45.00
No. 1 Wheels.	46.00-47.00

Railroad Scrap

No. 1 R.R. Heavy Melt	37.50-38.00
Malleable.	49.00-50.00
Rails, Re-rolling.	46.00-50.00
Rails, Random Lengths	39.00-40.00
Rails, 3 ft. and under.	42.00-43.00
Rails, 18 in. and under.	45.00-46.00
Railroad Specialties.	42.00-43.00
Angles, Splice Bars.	46.00-48.00

ST. LOUIS

No. 1 Heavy Melt. Steel	\$38.00-39.00
No. 2 Heavy Melt. Steel	34.00-35.00
Machine Shop Turnings	23.00-24.00
Short Shovel Turnings.	24.00-25.00

Cast Iron Grades

No. 1 Cupola Cast.	48.00-49.00
Mixed Cast.	46.00-47.00
Heavy Breakable Cast.	42.00-43.00
Brake Shoes.	44.00-45.00
Clean Auto Cast.	50.00-52.00
Burnt Cast.	44.00-45.00

Railroad Scrap

R.R. Malleable.	50.00-52.00
Rails, Re-rolling.	49.00-50.00
Rails, Random Lengths	42.00-43.00
Rails, 3 ft. and under.	48.00-50.00
Uncut Tires.	40.00-41.00
Angles, Splice Bars.	45.00-46.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	\$33.00
No. 2 Heavy Melt. Steel	33.00
No. 1 Busheling.	32.00-33.00
No. 2 Bundles.	30.00-31.00
Long Turnings.	25.00
Short Shovel Turnings.	27.00
Cast Iron Borings.	27.50

Bar Crops and Plate.	38.00
Cut Structural.	38.00

Cast Iron Grades

No. 1 Cupola Cast.	48.00-50.00*
Stove Plate.	42.00-43.00*
No. 1 Wheels.	44.00-45.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	38.00
R.R. Malleable.	nom.
Axles, Steel.	60.00-62.00
Rails, Re-rolling.	52.00-55.00
Rails, Random Lengths	38.00-40.00
Rails, 3 ft. and under.	46.00-48.00
Angles and Splice Bars	46.00-48.00

* Nominal.

SAN FRANCISCO

No. 1 Heavy Melt. Steel	*\$25.00
No. 2 Heavy Melt. Steel	*25.00
No. 1 Busheling.	*25.00
Nos. 1 & 2 Bundles.	*23.00
No. 3 Bundles.	*23.00
Machine Shop Turnings	*15.00
Bar Crops and Plate.	*27.50
Cast Steel.	*27.50
Alloy Free Turnings.	*13.00
Cut Structural.	*27.50

Cast Iron Grades

No. 1 Cupola Cast.	50.00-65.00
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Railroad Scrap

No. 1 Heavy Melting.	*28.50
Axles.	*34.00
Rails, Random Lengths	*29.00

*F.o.b. California shipping point.

SEATTLE

No. 1 Heavy Melt. Steel	\$27.50
No. 2 Heavy Melt. Steel	27.50
No. 1 Busheling.	27.50
Nos. 1 & 2 Bundles.	27.50
No. 3 Bundles.	24.50
Machine Shop Turnings	21.00-22.50
Mixed Borings, Turnings	21.00-22.50
Punchings & Plate Scrap	35.00
Cut Structural.	26.00-28.00

Cast Iron Grades

No. 1 Cupola Cast.	35.00-40.00
Heavy Breakable Cast.	35.00
Stove Plate.	30.00
Unstripped Motor Blocks	32.50
Malleable.	40.00
Brake Shoes.	35.00
Clean Auto Cast.	40.00
No. 1 Wheels.	37.50-40.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	28.50
Railroad Malleable.	30.00
Rails, Random Lengths	30.00-32.00
Angles and Splice Bars	28.50

LOS ANGELES

No. 1 Heavy Melt. Steel	\$25.00
No. 2 Heavy Melt. Steel	25.00
Nos. 1 & 2 Bundles.	23.00
Machine Shop Turnings	15.00
Mixed Borings, Turnings	15.50-16.00
Punchings & Plate Scrap	33.00-36.00

Cast Iron Grades

No. 1 Cupola Cast.	\$37.50-42.50
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For High Density Bales...use the Self-Contained **LOGEMANN Scrap Presses**

Press, Pump, Tank . . . all in one compact assembly

Available with Automatic Control

Both two and three ram models are available with automatic controls . . . and are recommended when the nature of the scrap warrants such application and where high output is desired.

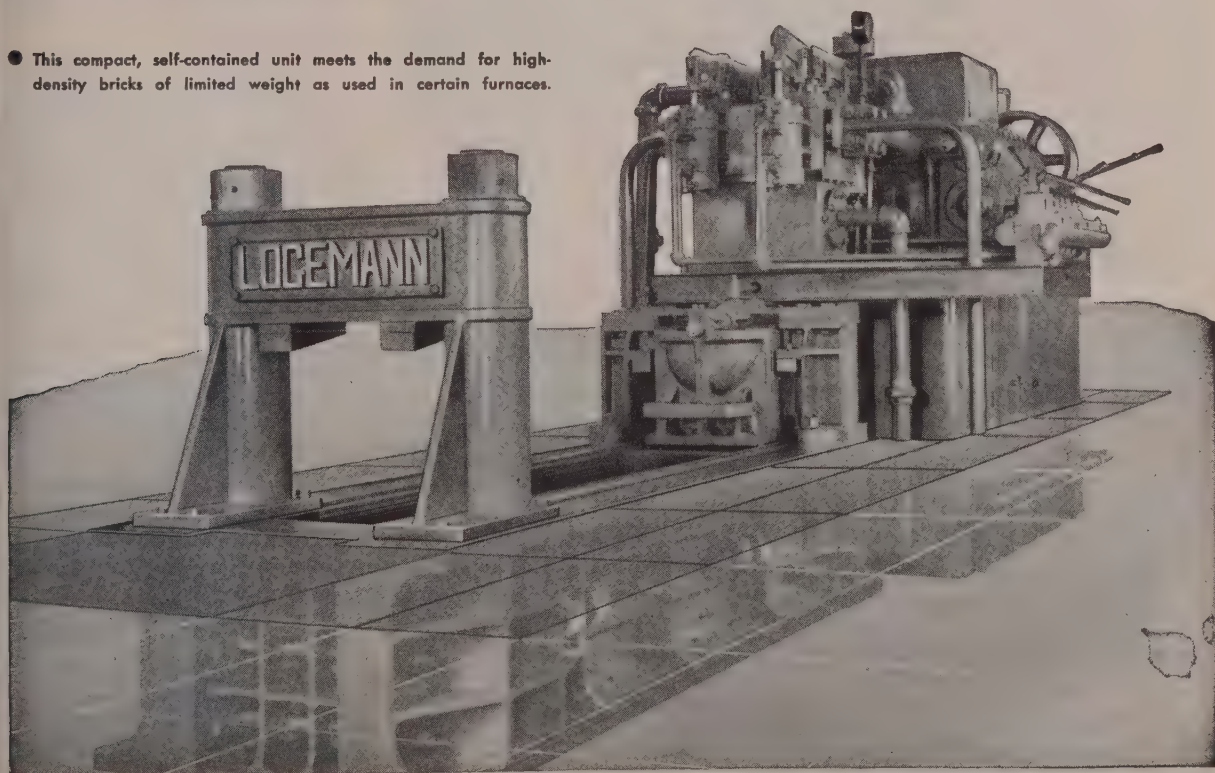
You conserve floor space and piping in plants and mills where space is limited . . . and at the same time, handle high tonnages at extremely low operating cost.

Pioneers in the metal baling field, LOGEMANN engineers have embodied the features proved through actual operation to be essential to constant, uninterrupted service. These same engineers are prepared to offer suggestions as to operating layout and installation of any unusual or specific need. Present your problem to them, stating the nature of your scrap and the tonnage desired. There is no obligation.

LOGEMANN BROTHERS CO.

3164 W. BURLEIGH STREET • MILWAUKEE 10, WISCONSIN

● This compact, self-contained unit meets the demand for high-density bricks of limited weight as used in certain furnaces.



Sheets Strip . . .

Demand for silicon sheets eases as motor production schedules are curtailed

Sheet Prices, Page 140

Pittsburgh—Sellers report increase in number of cancellations or voluntary reduction in previously scheduled monthly allotments, notably in silicon sheets due primarily to curtailment in projected production schedules of electrical motors. Demand for enameling stock has been affected adversely by a similar situation among stove and refrigerator manufacturers. However, broadening in end use applications for enameling sheets has offset this situation somewhat. Cold-rolled nonintegrated strip producers are experiencing continued difficulty in obtaining adequate hot-rolled stock and no easing in demand of importance yet has developed. Wide price range on cold-rolled strip remains intact. Stainless steel sheet demand has recorded some improvement, with one seller reporting order backlogs of 6 to 7 weeks, in contrast with 4 to 5 weeks late last year. This same interest states demand for stainless bars has recorded sharp increase with backlogs currently extended 12 to 14 weeks, against 5 to 6 weeks a few months back.

New York—Although sheet requirements in general still exceed supply, deferments are increasing, and there are some cancellations. This is particularly true in silicon sheets and strip, and to some extent in hot and cold-rolled material. Deferments range from one to three months.

Sellers report no difficulty in diverting tonnage and, in setting up their consumer quotas for shipment beyond the end of this quarter, either on a monthly or quarterly basis, appear to be limiting allotments about as much as ever. Consumers are confident, however, if the present trend continues, more tonnage will be available. They think there will be a sufficient slackening in general to allow more steel for those who want to get it.

Drum manufacturers may be added to the list of consumers who are now pressing less actively for sheets.

Boston—Until recently steel consumers were fearful of disturbing monthly mill quotas, taking in allocated tonnage regardless of needs to hold their position on rolling schedules. Now they are specifying more closely to nearby requirements with cutbacks and suspensions. Many users have accumulated an unbalanced inventory and, although short of some sizes and grades, they are unwilling to take in other tonnage simply because it is included in quotas. In flat-rolled, this changing trend is not reflected in hot strip mill schedules which are heavily loaded; March is blanked out on 0.40 carbon and higher by a leading hot strip supplier. Whether or not this means more low carbon for converters is conjectural. Latter are opening books for second quarter, but there is no rush for position; in any events, re-rollers are generally limited to April because of uncertain hot

strip supply. In sheets, the reversed trend is more apparent in specialties, including electrical and stainless; silicon sheet distribution allocated for next quarter shows many new patterns in lower grades, although demand for coils holds heavy.

Philadelphia—Most sheet sellers have set up second quarter quotas and allocations are generally being scheduled on about the current basis. Mills still have more demands than they can serve, except in silicon sheets, stainless and certain other specialties. Demand for hot carbon bars is fairly stable, with producers reporting some arrearages on their deliveries and holding out little encouragement to customers of any material increase in supply over the next few months. This is indicated in particular by establishment of second quarter quotas on an unchanged basis. Some consumers are benefitting from time to time by certain spot openings on mill schedules, but to date, they haven't been too important in the general picture.

Cleveland—Although a few consumers are turning down their allotments of carbon sheet and strip, the rejected tonnage is being eagerly taken by others. The remaining overall demand appears sufficient to assure capacity mill operations for the first half of this year. One leading producer soon will announce quotas for May; its April quotas, based on capacity operations, were considerably short of accommodating demand. Consumers turning down allotments are railroad car builders and appliance makers, notably stove producers.

With electric motors in plentiful supply, demand for silicon sheets, especially from the highest-priced producers, is off, some consumers not taking all of the quotas available to them. However, demand for silicon coil stock remains substantial.

Chicago — Most mills report being unable to see any lessening in sheet steel demand except on a few specialty items, but they realize they will be the last to know at first hand that requirements are off. Demands on midwestern producers have been stronger right along because of withdrawals by eastern mills and this, plus increasing resistance to premium steel, results in pressure which appears to be stronger than ever. The picture in conversion is also difficult to appraise, since the carryover into second quarter is so heavy books that for conversion operation will probably be opened for only about one month's production. Gray market operators are definitely caught in a price squeeze, those who are committed to take delivery on high-priced material now expecting to take substantial losses in its disposal.

Cincinnati — Despite cutbacks in some consumer goods, overall demand for sheets at district mills is undiminished. Quotas for second quarter have not been established but the apparent gap between supply and demand indicates allotments will not be expanded much, if any, from those of the first quarter. Government programs and other barometers point to an aggravated pinch in galvanized.

Birmingham — No improvement is evident in sheets as far as availability

is concerned. Particularly scarce are roofing sheets with manufacturers' sheets little if any better off. The only solution to the sheet problem, even with return of so-called normal conditions, some observers believe, is additional capacity.

St. Louis—Scattered cancellations in sheet orders persist. Although the tonnage is trifling, mills regard the trend as significant. Orders from farm equipment manufacturers, an important criterion in this district, are holding firm. Cancellations are from small firms which apparently can't stand the strain of more competitive business conditions. A number of requests to hold up deliveries or orders, with the right to reinstate, have been received. Sheet allocations for the second quarter were made last week, with customers' quotas trimmed around 30 per cent to allow for January carryover and an anticipated two-week partial shutdown at Granite City Steel Co. for repairs. The company's new cold reduction mill has been picking up speed consistently, with the result the firm's ingot and finished steel output in January rose 8 per cent to new all-time highs.

Los Angeles—Demand is strong and supplies of flat-rolled products still are inadequate, but consumers' thirst for steel has lost some of its sharpness. Fabricators in many instances have smaller backlogs than a few months ago and their requirements are reduced; others are buying extremely cautiously and only for minimum needs.

San Francisco — Little change in total demand for flat-rolled items is noted despite cautionary tendencies of some users. Supply remains inadequate for all needs, but gray market activity is slackening.

Alloy Steel . . .

Cleveland — Alloy steel demand is reported slightly easier. Among consumers asking for less tonnage are forgers and producers of heavy trucks. On the other hand, demand from machine tool builders and passenger automobile companies continues at a high level. Accumulation of substantial stocks of petroleum products and resultant decline in oil well drilling is lessening the demand for alloy steel as a substitute for hard-to-get carbon steel oil country pipe. Demand for aircraft alloys continues good. The increase put into effect last fall in alloy grade extras on mechanical and pressure tubing has been removed by the Steel Tube Division of Timken Roller Bearing Co., Canton, O.

Tool Steel . . .

Tool Steel Prices, Page 141

Pittsburgh — Tool steel demand continues depressed and there are no indications of improvement in near future. The downward trend in new orders has been checked in recent weeks, reflecting gradual adjustment in inventories to more realistic levels. Quotations generally have been maintained despite sharp reduction in new business since last fall which has necessitated curtailed production schedules in some instances.

Steel Bars . . .

Bar Prices, Page 140

New York—With some notable exceptions hot carbon bar sellers have set up second quarter quotas, which, despite easing in spots, appear to be about the present basis. Currently the railroads are taking less tonnage, canceling in some instances and deferring shipments in others. There also have been some deferments on the part of manufacturers of automobile accessories, although tonnages involved have not been heavy. Consumers generally, in view of the trend over the past few weeks, are confident they will be able to get more tonnage during the second quarter. Actually some have been given more tonnage for next quarter, but these are the exception.

Some producers, who have set up quotas only on hot carbon bars for the month of April, have set up allotments for the entire quarter on cold-drawn carbon bars and have plenty of capacity available for alloy specifications.

Pittsburgh — Alloy bar producers report relatively large number of order cancellations or voluntary reduction in mill allotments. However, orderings in rolling schedules are quickly taken up by other customers and no difficulty has been experienced in lining up second quarter production schedules. Most customers are more inventory conscious, with result reassurance for deliveries has eased somewhat. Sellers note for the first time in months that some cancellations are originating from producers of oil well drill collars, sucker rods and bits. Some easing in demand also is noted among automotive parts suppliers, and military tonnage also is not up to expectations.

Tin Plate . . .

Tin Plate Prices, Page 141

San Francisco — Difficulty of western food packers to sell large amounts of canned goods produced in 1948 may result in smaller food pack next summer. Result would be a reduction in tin plate demand. No orders for cans are being placed during present in-between-seasons period and first 1949 orders will appear in late February and early March when spinach packing begins. Columbia Steel Co.'s new cold-rolled mill at Pittsburg, Calif., currently is operating about 70 per cent on tin plate, 80 per cent on sheets.

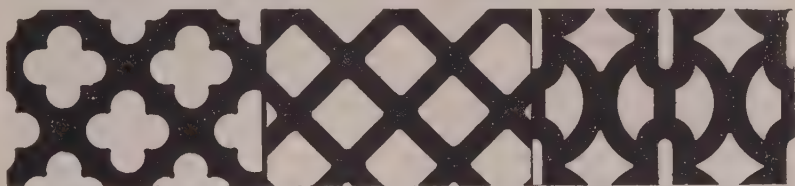
Semifinished Steel . . .

Semifinished Prices, Page 140

Cleveland — Consumers relying on conversion ingots to supplement their mill supplies of finished steel are reported becoming increasingly selective and switching where possible from producers of lower-quality ingots to those providing higher-quality. As a result, one leading producer is booked through March for the conversion ingots it can produce and could have had more orders. This producer has not opened order books for April delivery. Among principal purchasers of conversion ingots are appliance makers. Although many of



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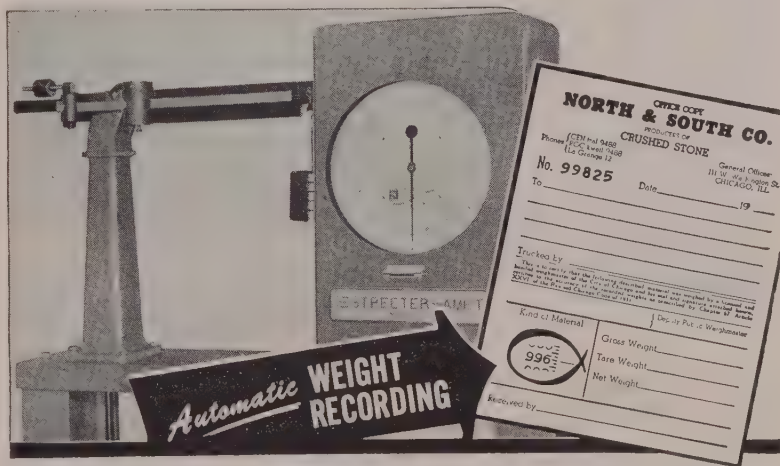
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them have cut back production, they are building inventories and still need more finished steel than can be obtained from mills.

Plates . . .

Plate Prices, Page 141

Demand still exceeds supply, although premium sellers make price concessions

Philadelphia—Despite concessions by premium sellers, leading plate producers still have far more inquiries than they can handle. In fact, the situation recently has been complicated by the blanking out of March orders by one large mill, with only a limited amount of new tonnage being accepted for April, and by uncertainty as to what another large producer will do with respect to second quarter tonnage. To date, this latter interest has not set up quotas for shipment beyond the end of this quarter, with arrears understood to be fairly substantial.

Inquiries here from consumers in the Midwest and other districts appear to have been stimulated of late by curtailed mill allotments in those districts and by increasing consumer resistance to premium prices. Some local district consumers are putting extra pressure on eastern mills for the same reason. Certain spottiness prevails, as indicated in recent issues, but there is still more demand than supply. This is borne out not only by the situation at the mills, but by difficulty jobbers are having in maintaining stocks at even a reasonable minimum.

However, further shrinking in freight car orders, and even some scattered cancellations, is causing speculation in the plate trade as to the possibility of tonnage being released for other work before the second quarter is over. Under the present voluntary allocation program, about 112,000 tons of plates (the major item in this program) are being allocated monthly for car construction. Of particular significance recently was the warning to railroads by Col. J. Monroe Johnson, director, Office of Defense Transportation, that "ODT is with difficulty able to allocate on the 10,000-car level to May but not beyond without additional orders."

Birmingham — Steel interests here describe the plate supply situation as "very critical." Plate backlogs have not materially dwindled, according to local sources, despite extra concentration on production. The situation has been somewhat emphasized with recent developments at Gadsden where major tonnage is going into pipe production.

San Francisco — Scarcity in plates continues, and prospects for increased supplies for general consumers are not bright for immediate future.

Seattle — Plate fabricators are handicapped by a shortage of materials, mill allocations being far below normal requirements. For this reason, it is impossible to bid on desirable contracts. Current operations

consist largely of tanks in small tonnages.

Nail Supply Remains Tight

Cleveland—Nails still are not in abundant supply, declares one leading producer in reply to a published report that nail stocks are jamming warehouses.

The statement of over-supply was made in connection with a report the National Association of Steel Exporters Inc. is requesting the government to ease or lift export controls on nails. Some exporters warned that continuation of controls would give European nail makers an unfair advantage over the United States, particularly in sales to South America and Africa.

A leading maker of nails said it gets far more orders for that product than it can fill, with a result that merchants' stocks still are unbalanced.

Wire . . .

Wire Prices, Page 141

Boston — In terms of weight, volume of wire affected by cutbacks and cancellations is small in ratio to the number of such cuts; trend indicates rather general inventory correction in balance as to sizes and grades based on some more conservative end-use programs this year. Heading wire is easier. Until recently it was very tight. Pressure for additional sizes is softening and some screw manufacturers are not taking full allocations this quarter. Screw backlogs are thinning and a return to more normal buying in line with requirements is foreseen in second quarter, for which early schedules are being made up. Demand for specialties is more mixed, various annealed and processed wires remaining in short supply with easing in others. Improvement in available rod tonnage, while slight, is not sufficient to ease overall pressure materially. Upholstery spring wire is slow.

New York — Reflecting continued easing in spring wire for bedding and upholstery use, quotas for second quarter are being eliminated in some instances. Cancellations, cutbacks and stagnant demand for this grade make allocations unnecessary at current production. In scheduling for other products, volume is being offered at first quarter levels with the likelihood of mild reductions in some processed and annealed wire. Slackening demand has loosened other grades and pattern of distribution in months ahead will be shaped more by selling than by arbitrary allotment; this may not apply to all types of wire, but will involve a larger ratio of tonnage than heretofore. With exception of heavier sizes of nails and wire spikes, demand for that product is strong, notably roofing nails.

Cleveland—Demand continues almost undiminished for manufacturers' wire products, with exception of specialties. As to the latter, some soft spots have been noted in ordering. On the whole, however, demand still exceeds supply.

Reflecting heavy requirements of bolt and nut makers, demand for hot-

rolled rods is notably strong. Although demand for upholstery wire declined slightly because of reduced needs of furniture makers and model changeovers in the automobile industry, the easing is expected to be only temporary. After sustained high demand for wire, makers of coil hangers substantially reduced their ordering for a couple of months, but have asked for full allotments of material for April and May.

Birmingham—Wire products have softened "a little bit," trade sources say. Manufacturers' wire is still relatively tight, while nails, although still on the scarce list, are somewhat easier. Probably the most marked change is in barbed wire and wire fencing which are in better supply, although spring is expected to intensify the demand.

San Francisco — Producers of wire items are awaiting return of spring for test of market strength. Demand currently is ebbing but some producers believe slump is seasonal. Supplies of most items are more than adequate.

Tubular Goods . . .

Tubular Goods Prices, Page 141

Washington — East Tennessee Natural Gas Co. has been authorized to delay start of construction on a natural gas pipeline project for six months from Feb. 2, 1949, because of the shortage of steel pipe. This project, estimated to cost \$11,470,590, will consist of about 186 miles of pipe extending from Tennessee Gas Transmission Co.'s main line to the Chickamauga Dam area near Chattanooga, Tenn., and a 112-mile line extending on to a point near Knoxville, Tenn.

Cleveland—Jobbers report a slight easing in demand for merchant pipe, but want all tonnage they can get from mills. This easing in demand is accompanied by increasing selectiveness on the part of jobbers' customers. Noting these trends, jobbers are inspired to see whether they can obtain additional tonnage by virtue of order cancellations from other sources. However, such efforts are unavailing. Demand for oil country and transmission line pipe continues far ahead of supply, some contracts for line pipe running through 1951. One producer is confident it could book line pipe orders for delivery through 1950.

Los Angeles—Pressure on pipe fabricators and suppliers of oil field equipment is being lessened by a continued easing in the requirements of petroleum producers. The combination of an unusually severe winter in the West, large-scale oil imports and the domestic industry's high rate of output, has resulted in storage facilities bulging with supplies. Prices are being slashed on industrial fuels and heavy gravity crude and output at California fields has been reduced by 15,000 barrels daily. Oil imports at the same time are being cut back in some instances as much as 50 per cent. While all this for the time being has dampened the buying of oil country goods, suppliers believe that the spring revival in demand for petroleum products will be preceded by increased requirements on the part of producers.

Structural Shapes . . .

Structural Shape Prices, Page 141

New York — Excess industrial construction needs, which had been accumulating over recent years, appear now to have been fairly well taken care of. As a result, current industrial activity is close to a normal basis for the first time since before the war. As a matter of fact, industrial building may be a little below normal, although there are still various projects, chiefly small, being figured.

Office and apartment house needs are still a long way from being met, but with costs and other factors becoming more stable, fabricators look for expanding volume. Not only major raw materials but various building components and fixtures are in somewhat better supply.

Builders can go ahead now with some assurance as to deliveries and costs, the latter showing a more stable trend as applied to both labor and materials. They can estimate more closely as to when a job will be completed and as to how much it will cost. In the past many have had to add substantially to their estimates in an effort to take care of unexpected contingencies.

At present public work continues to be heavier than private. An outstanding award involves 3750 tons of hangar work at Idlewild Airport.

Boston — Bridge and highway programs are getting under way slowly; while more structures are planned this year than last, fewer large-tonnage spans are scheduled and total tonnage required for bridges may be less. Aggregate volume being estimated is slightly heavier with public work going into the lead. Contracts for fabricated structural work are frequently awarded on a delivery basis and shop shipments vary from three to six months. Allocation of plain material will closely parallel first quarter, which in effect will be a reduction from the monthly and quarterly average one year ago.

Philadelphia — Structural fabricators are not able to get all the steel they require but, nevertheless, are receiving enough to maintain operations at around 85 per cent of normal capacity. Despite a falling off in demand, especially for industrial construction, most shops have substantial backlogs. Medium sized shops and larger are estimated to have backlogs ranging from five to seven months. Meanwhile, shape producers have opened their books for second quarter on about the same basis as at present. However, there are some indications that before the period is over supply may be a little freer.

Bridge work features current activity with 37,000 tons, including cable and miscellaneous steel items, for the Delaware River Memorial Bridge, near Wilmington, having been placed and 6,000 tons for the state turnpike bridge, near Steelton, Pa., up for bids Feb. 28.

Cleveland — Some firms here have received circulars from a Dallas, Tex., company offering steel imported from Luxemburg. Products listed are beams, angles, channels, bars, and plates. Prices range from 6.00c to 8.00c a pound. Ships carrying cotton from southern ports to Europe are reported

edly bringing back iron and steel.

Chicago — Fabricators' new inquiries are definitely lower but the need for finding ways to cut quotations to get the available business has increased the pressure on mills for deliveries. No term like "the doldrums" can be applied to an industry in which many of the larger units have backlogs sufficient for many months' operations without seeking business, but small firms are definitely depressed. Upsurge in bridge repair work is expected in the plains states when the extent of damage by recent snow storms can be determined. Duffin Iron Co., this city, a prominent fabricator, is being liquidated. Its facilities are now up for sale.

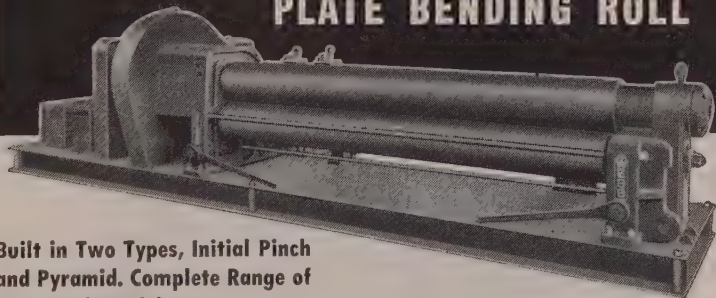
Birmingham — Shape demand is somewhat stronger due mainly to considerable public work, including bridges. Little leeway is expected before next fall unless conditions change materially.

Los Angeles — Structural materials are much more plentiful than at any time for months past, due in part at least to greater receipts from eastern sources. One supplier last week received two shiploads of shapes and beams.

Seattle — Fabricators report less work in small tonnages, but plant operations continue at an average level. Inability to obtain materials beyond quotas makes it impossible for some operators to bid on the larger jobs.

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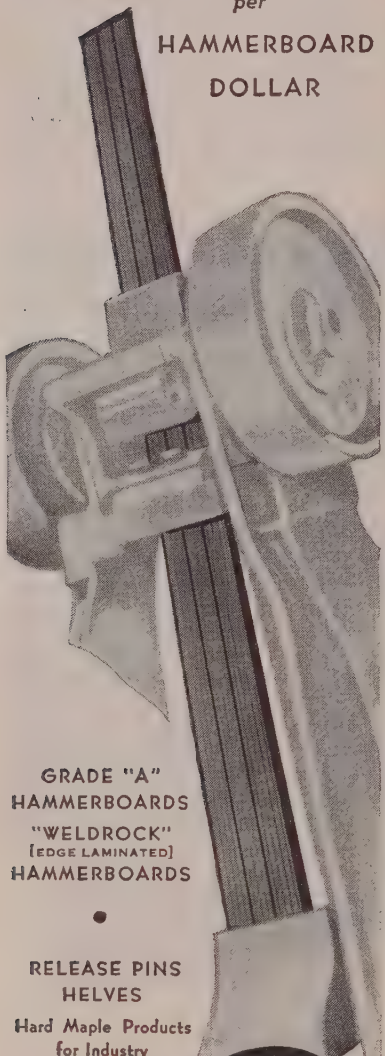
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Reinforcing Bars . . .

Reinforcing Bar Prices, Page 140

Philadelphia—While supply is still scarce, substantial reinforcing steel tonnage is being sought, mostly for public requirements. Outstanding new inquiry includes 1310 tons for the proposed state turnpike bridge, near Steelton, Pa., which will also require 6000 tons of structurals. The state turnpike program, which calls for construction of roadway from Carlisle to King of Prussia, near Norristown, will require 9753 tons of reinforcing steel. Work got under way last November and to date general contracts have been let for five sections—sections 22C, 23B, 23C, 24B and 24C—involving 1270 tons of reinforcing steel.

San Francisco—Future prospects are mixed. At present, demand for highway construction is reduced. On Feb. 1 there were 209 California state road projects under way compared with 283 last Nov. 1. On the other hand, indications of increased federal spending on western irrigation and hydroelectric projects improves long range outlook for continued high demand.

Seattle—Rolling mills are operating at peak capacity, concentrating on reducing sizable backlogs. Weather conditions have eased the pressure for small tonnages of reinforcing bars and current demand is mostly for public works. A good demand is reported for small angles. Merchant bars are also active. Mill operations are handicapped by inability of contractors to accept deliveries as planned because of severe weather.

Firm Offers Contract Work

Cleveland—With part of its facilities idle as a result of the general decline in stove business, an Ohio stove plant is offering to do contract fabrication, assembling, finishing and screw machine work. The company also can furnish some cold-rolled sheet steel for the work. Another branch of the company is offering to do contract foundry work.

Although contract work is a new venture for the Ohio plant the efforts thus far appear promising, said a company official. Since the stove business decline, the plant's employees have been working three to five days.

Entrance into contract work* is more than temporary, according to the company official. The stove industry's capacity, he said, exceeds normal needs, and now that supply has caught up with demand, stove plants must turn to other production in an effort to utilize all facilities.

Gogebic Ore Shipped by Rail

Ironwood, Mich.—First iron ore from the Gogebic Range to be loaded this winter into railroad cars by steam shovel left Feb. 9 for mills in Birmingham. This shipment in 125 cars is the first of 250,000 tons which is scheduled for movement, according to Harry W. Byrnes, superintendent of the Ironwood District for the Oliver Mining Co. The movement, longest by rail for Gogebic ores, will continue until the Great Lakes navigation season opens.

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Pig Iron . . .

Pig Iron Prices, Page 142

Pressure for deliveries eases as melt declines and scrap supply improves

Philadelphia—Continued decline in cast scrap prices is relieving some pressure on pig iron. While foundries generally are endeavoring to increase their pig iron ratio in the melt, the fact is that cast scrap prices for the first time in some years are below the cost of iron and are approaching the relationship which normally exists between these two materials. For instance, No. 2 foundry delivered, Philadelphia, is at a minimum price of \$50.80, as compared with \$48 to \$49 delivered for No. 1 machinery cast and substantially lower for No. 1 cupola cast. Foundries are again showing somewhat less interest in pig iron and more in scrap as a result. Meanwhile foundry operating rates continue on a somewhat restricted scale, with various plants doing little better than three days a week.

New York — Although foundry operations are spotty and continue restricted, pig iron demand is more than sellers can meet. However, with prices continuing to ease, cast scrap is reaching a point where, for the first time in several years, it is becoming less expensive than iron and this may have a restricting influence on demand for iron. However, some trade observers believe that scrap prices are settling to a point where there may be substantial reaction, although there are no definite indications at the moment.

Supporting current demand for pig iron is the desire of most foundrymen to increase the pig iron ratio in their melt, which has dropped far out of normal balance, and thus improve the quality of castings in an effort to meet the stiffer competition which now exists. Another supporting factor is that inventories at foundries generally continue light.

Cleveland — Further weakening in the jobbing foundry business is reported. As a result, one foundry has reduced operations another 10 per cent by cutting working hours and labor force. In these reductions employers are weeding out the least desirable employees. One leading foundryman estimated the foundry business decline has cut operations 30 per cent below that of a year ago.

As a result of these cutbacks, some foundries have reduced their demand for pig iron. However, any tonnage declined by one consumer can be diverted readily to others inasmuch as foundries are still endeavoring to raise the proportion of iron in their melts so consumption of higher-priced scrap can be reduced and quality of castings improved. An effect of this effort is reflected in the recent sharp contraction of demand for foundry grades of scrap.

Reduction of some castings prices by as much as 10 per cent is reported.

Buffalo — Mixed tendencies dominate the merchant pig iron market here. On the brighter side were reports that a number of workers laid off late in 1948 were being recalled.

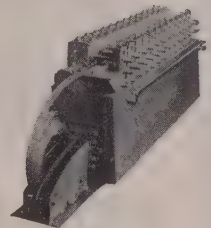


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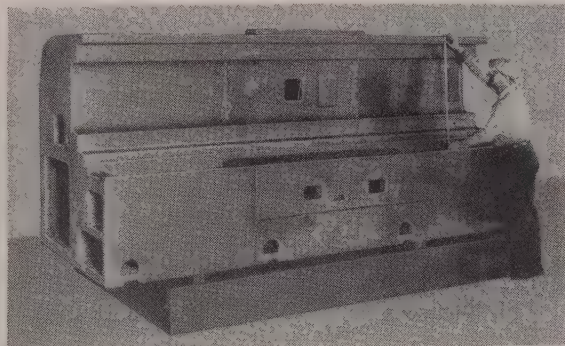
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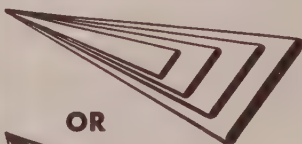
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On the other hand, foundries report difficulty replenishing backlogs. One of the leading melters in the area reported capacity operations, but a 50 per cent shrinkage in order backlogs. A sales search was reported also for new business. Smaller jobbing plants, depending on sublet orders from the big producers, were harder hit with many on a curtailed week. Sellers still have no trouble disposing of their entire production.

Chicago — Improved quality of coke and sustained high level of blast furnace operations have been important factors holding steel production near to peak. One steel producer, now engaged in an extensive repair program, has been able to maintain its steelmaking rate well above expectations because of increased use of hot metal. Foundries, of course, would like to increase the iron ratio but are not pressing nearly as hard as formerly for ex-quota tonnage.

Cincinnati — All foundry iron available to this district is taken avidly even though the melt is light, especially among the jobbing interests. When the pig iron is provided, melters are cutting the proportion of scrap. Although demand is still in excess of supply, the pressure for deliveries has moderated.

Birmingham — Pig iron production remains at capacity and merchant iron men declare they still have a place for every pound of iron they can produce, despite adverse conditions in some consuming circles. The shortage in peak times, however, has been estimated at as high as 50,000 tons monthly.

St. Louis — Apprehension long felt in this district for its pig iron supplies was dispelled last week with delivery by the War Assets Administration of a deed to the government-owned portions of Missouri-Illinois Furnaces Inc., Granite City, Ill., to the company. Title changed hands after the Supreme Court refused to review a decision of two lower courts approving Mo-Ill's bid of \$3,255,000. The award had been contested by Fulton Iron Works, St. Louis, and some local consumers had feared a change might deprive them of iron supplies. Pressure on pig continues to ease moderately but overall demand is still greater than supply. Some foundries which had resorted to foreign pig have reinstated local orders, now that imported higher-priced stocks have been exhausted. This district's February production will show a fractional decline because of recent difficulties with frozen cars and coal, hampering coke oven operations.

Seattle — Foundry operations have slowed and the larger plants have temporarily withdrawn from the scrap market here. Business is definitely less and foundrymen look for further recession. The cast iron scrap market is currently \$35 to \$40. Pig iron is available in small tonnages but sufficient for present operations.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 142

Pittsburgh — Market for beehive foundry coke continues restricted,

with output currently in excess of demand. No weakness in prices, however, is reported and there is fair prospect current quotations can be maintained because of indicated gradual improvement in jobbing foundry operations. Beehive furnace coke remains in short supply as is also the case for oven foundry and furnace coke. Some oven foundry coke is still shipped here from Daingerfield, Tex.

Scrap . . .

Scrap Prices, Page 146

Prices continue to decline in leading districts. Actual sales remain light

Pittsburgh — One major consumer did not accept an offer of a representative, large tonnage of open-hearth scrap last week at \$37, off \$2 from last purchase price contracted by another interest. Some trade authorities anticipate mills will re-enter the market at around the \$35-\$36 level, although there are a few who contend a somewhat higher price range is a possibility because of basic fact Pittsburgh is a "minus" scrap area, and because of the continued favorable outlook for capacity steel production. With exception of the lone offer of scrap at the lower price level, brokers and dealers are prone to "wait-out" the market. Most interests expect a clarification of the muddled price structure this week. In absence of new open-hearth scrap purchase up until late last week, quotations are nominal at former levels. Therefore, the published prices, which are based on last purchase delivered to consumers' plants, do not accurately reflect at what price level mills could buy scrap in today's market. A recent sale of machinery cast at \$60 for February delivery represents a further drop of \$3 to \$5 a ton for this quality cast scrap. Continued price weakness in other cast grades also is noted. A sale of railroad heavy melting steel was made at \$42, down \$2. Railroad specialties were quoted \$49-\$50. Similar weakness is reported for other railroad items. Downtrend in turnings continues with sale of machine shop reported at \$34.50.

Philadelphia — Open-hearth grades of scrap have undergone a further decline, with No. 1 now holding at \$39-\$40, delivered, and No. 2 heavy melting steel and No. 1 busheling at \$35 delivered. No. 1 bundles show little change at \$38, but No. 2 bundles have declined to \$33, thus establishing a substantial differential under other secondary open-hearth grades for the first time in quite a while.

Mill buying of melting steel scrap continues light. For instance, the recently established price of \$35 on No. 2 steel resulted from little more than a token purchase by one of the district mills. How much further the present trend will continue is difficult to ascertain. Mill stocks are substantial, but collections of yard scrap are definitely down, as collectors are having difficulty moving what they get. Some collectors, because of the poor outlook, have not as yet even

taken out their 1949 licenses.

Machine shop turnings and mixed borings and turnings are off slightly to a range of \$31-\$31.50 delivered, and heavy turnings are off slightly to \$39. No change is noted on low phos scrap prices.

No. 1 cupola cast is down to \$35, No. 1 machinery cast, \$48 to \$49; heavy breakable cast, \$44-\$45; unstripped motor blocks, \$42-\$42.50; clean auto cast, \$48; and No. 1 wheels, \$48-\$49. Charging box cast is unchanged, and malleable is weak but nominal, as there is too little business to gage the market.

New York — With back contracts having expired, scrap brokers here have dropped their buying prices sharply and, as there is little actual buying being done, these lower prices are largely nominal. No. 1 heavy melting steel is now \$32, f.o.b. shipping point; No. 2 heavy melting, \$30; No. 1 busheling, \$30; No. 1 bundles, \$32; No. 2 bundles, \$30; No. 3 bundles, nominal; machine shop turnings and mixed borings and turnings, \$18-\$20; short shovel turnings, \$20; punching and plate scrap, cut structurals and electric furnace bundles, \$35-\$36; No. 1 cupola cast and charging box, \$40; heavy breakable, \$36; unstripped motor blocks, \$37-\$37.50.

Boston — Both cast and steel scrap has sagged in cost to melters to former normal levels in relation to pig iron and in case of open-hearth grades the pendulum swings even lower. No. 1 cupola cast is now around \$20 under the highest postwar peak. Absence of outside buying and indifference on part of district consumers coupled with pressure for lower prices has reversed the price trend in matter of weeks. Freer supply of pig iron and lower melts are also factors. Yards have lowered prices on incoming scrap, but some acted late on the falling market. Bulk of steel scrap is moving at \$30.50, shipping point, and while open hearth grades are weak, likelihood of stabilization appears more probable than in cast.

Cleveland — Further weakness in the scrap market is reflected by additional price declines. Although No. 1 and No. 2 heavy melting steel remain at \$37-\$37.50, turnings and borings are off around \$3 and low phos down \$1. Dropping below No. 1 and No. 2 heavy melting steel, the price of No. 2 bundles is now \$36-\$36.50. Foundry grades slumped from \$3 to \$10, with No. 1 cupola now \$55-\$56 and malleable \$60-\$60.50.

One broker believes No. 1 heavy melting will recede to \$35 when large-scale buying is resumed by steel companies.

Some of the major steel mills bought limited tonnages last week. Foundries generally remained out of the market now that their business has eased. Also, foundries are increasing the percentage of pig iron and reducing the proportion of scrap in their melts.

Helping one major steel company remain out of the domestic market are sizable receipts of excellent quality foreign scrap. A considerable amount of unprepared domestic scrap is reported coming onto the market.

Buffalo — With dealers continuing to mark down offering prices the scrap market plunged an additional \$2 to \$2.50 a ton during the week. A

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test of the market was expected soon as outstanding contracts were completed by heavy shipments from dealers. Mild weather has spurred collections. Despite shipments, one of the leading mill consumers was reported taking scrap off the ground to maintain ingot production. The latest price dip carried No. 2 heavy melting, and related items, to a range of \$37-\$38. There are rumors of buying interest at roughly \$2 below this range, but no sales were reported. There was also a report of a limited tonnage sale at a shade above the range, which called for No. 2 scrap, no bundles. Some midstate material is moving to a Valley consumer on the basis of \$39, Buffalo delivered.

Chicago — Scrap offering prices were down again last week. There apparently is no resemblance in the present price structure to the normal differentials between grades which existed under price control and have been in general use, with slight variations in a moving market, since demise of OPA. Small tonnages of specialty items moved against higher priced orders than those which could be contracted for now but these are expected to be cleaned up in a relatively short time. No new heavy melting orders were uncovered, local mills apparently being satisfied to use up inventories and ignore both dealer and industrial scrap offerings. With no indication when heavy buying will be resumed, dealers are hesitant about augmenting yard stocks, and the feeling is more prevalent now that unless the stalemate breaks soon some yards will be out of business. There is no general agreement in the trade as to what prevailing price levels are, or to what level prices can drop. Some interests, however, speculate that allocated scrap buying prices cannot be reduced much more without a furor being raised over finished steel prices.

Cincinnati — Weakness persists in the iron and steel scrap market although quotations, in absence of tonnage buying, are unchanged and nominal. Demand for most grades is dull, the inventories of most melters being such that they are not interested in further purchases, in this drooping market. Some major melters are restricting shipments. Some of the weakness in prices comes from reports that bidding on recent railroad lists was below expectations.

Birmingham — Marked weakness continues in the scrap market with heavy melting down this week to \$35. Most observers do not anticipate a "panic" situation in scrap, although they do believe further declines are in order. An exceptionally mild winter together with slackening in foundry operations largely accounts for the weakness in scrap.

St. Louis — Mills and foundries remain practically 100 per cent out of the scrap market with the result there still is no established price level. What trading exists is solely between brokers seeking to fill old orders about to expire and does not represent mill buying prices. On the basis of these broker deals, however, prices receded again last week, with some No. 2 melting steel changing hands at \$34-\$35, down about \$3. Mixed and No. 1 cupola slipped \$1 and railroad items \$1 to \$5. Future price outlook continues downward unless, as begins

to appear probable, mills all re-enter the market at the same time. Cast grades are especially uncertain. Dealers say that because of foundry cutbacks, good scrap inventories and easier pig supplies, they cannot obtain new orders from foundries even when price is no object.

Los Angeles — After more than a month of confusion and uncertainty in scrap circles, prices for steelmaking scrap have dropped sharply. Nos. 1 and 2 heavy melting steel are down \$2.50 per gross ton, Nos. 1 and 2 bundles are off \$4.50, and machine shop turnings down \$5. Although weather conditions are currently hampering delivery of materials from out-of-state, and local collections are only fair, mills in past weeks have been able to improve their inventories, are now absorbing somewhat smaller tonnages, and buying more selectively.

San Francisco — Prices dropped \$2.50 to \$5 a ton last week on leading grades of open-hearth material in this district in sympathy with declines in the eastern steel centers. Nos. 1 and 2 heavy melting declined from \$27.50 to \$25 while dealers' hydraulic-compressed bundles declined from \$27.50 to \$23. Machine shop turnings eased from a price of \$18 to \$15.

Factors causing price declines include: Arrival of two shiploads of scrap from Pacific islands and Japan; a slackening of flow of western scrap to eastern markets; greater availability of pig iron; a surplus of foundry scrap, caused by a drop in foundry activity. Overseas tonnages now coming in will offset loss of scrap from recently-terminated ship scrapping operations. Overall supply for western mills now is ample for the immediate future. Indications point to continued receipts of large amounts of scrap from Pacific areas during the next few months.

Seattle — Anticipated break in steel scrap prices appeared here last week, mills announcing a level of \$27.50 gross, f.o.b. dealer's yard for steel-making grades. This is a drop of \$2.50 from the level that has prevailed several months. Although transportation has been handicapped by weather, scrap receipts are fairly large and inventories are rising slowly. Bethlehem Pacific Coast Steel Corp. last week received a water shipment of 9000 tons of scrap from Japan, consisting of forgings and other desirable items. This is the first full cargo from Japan to arrive here. The same interest has contracted for several additional cargoes from Japan, delivery optional at various Pacific Coast plants.

Refractories . . .

Refractories Prices, Page 142

Pittsburgh — Some easing in demand is reported for standard clay brick shapes. However, overall demand-supply situation in refractories has recorded little change in recent weeks. Some consumers still are forced to use ladle brick substitutions, reflecting continued heavy demand from the steel industry. Order backlogs are extended well into third quarter in most instances on super-duty clay brick and special shape silica

bricks. Relining work for much over-worked coke ovens, blast furnaces and open hearths continued unabated. No change in refractory brick price levels is reported.

Storms Cut Bentonite Supply

Chicago — Foundrymen are fearful the current shortage of western bentonite, a colloidal clay widely used in bonding synthetic sands, will cause a serious drop in their operations. The volcanic ash material is produced in Wyoming and the Dakotas where blizzards have brought mining and transportation to a standstill. Because the properties of the western material differ greatly from those of the southern product, foundries are unable to substitute the latter without changing their practices substantially. Sellers of bentonite are being deluged with rush orders which they are unable to handle or give any firm delivery promise.

Warehouse . . .

Warehouse Prices, Page 143

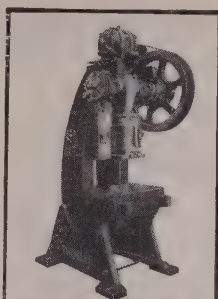
Cleveland — Inquiries at warehouses for steel are declining and prospective buyers are increasingly price conscious. However, overall demand exceeds supply and some warehouses report stocks remain unbalanced. Sheet and plate continue difficult to get, the latter said to be in tightest supply of all products. Hot-rolled light flat bars and bar rounds under 2-1/2 in. and over 4 in. are not easily procured. Some warehouses report structurals in relatively good supply.

Chicago — Greater selectivity, less frantic ordering, disinclination to take anything but primes, are the conditions generally prevailing with warehouse customers. There is far from enough first quality steel to meet requirements and inventories are badly depleted in popular products, but the market is infinitely more orderly than it was a few months ago. Plate and pipe demand are generally regarded as strongest, with structurals also high on the list. The situation in these products has not materially changed, with even the larger warehouses being unable to fill most of the items on order lists they receive.

Cincinnati — Inquiries indicate a seasonal pickup soon in demand on warehouses for building steel, but stocks are low and jobbers can foresee no early improvement. Sheets and plates are critically short, although buying by some of the smaller fabricators has receded. Overall demand continues considerably in excess of steel supplies.

Los Angeles — Although steel jobbers report the decline in new orders still continues, their rate of decrease in many cases has flattened out. One large warehouse supplying widely diversified customers was off 15 per cent on new business in January as compared with the November-December average. Thus far in February, its business is off not more than an additional 2 or 3 per cent. Receipts of sheets and plates by jobbers still are extremely limited, but supplies of structurals and round merchant bars of low-carbon steel currently are sufficient to meet most requirements.

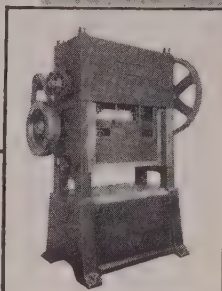
Seattle — Jobbing houses report



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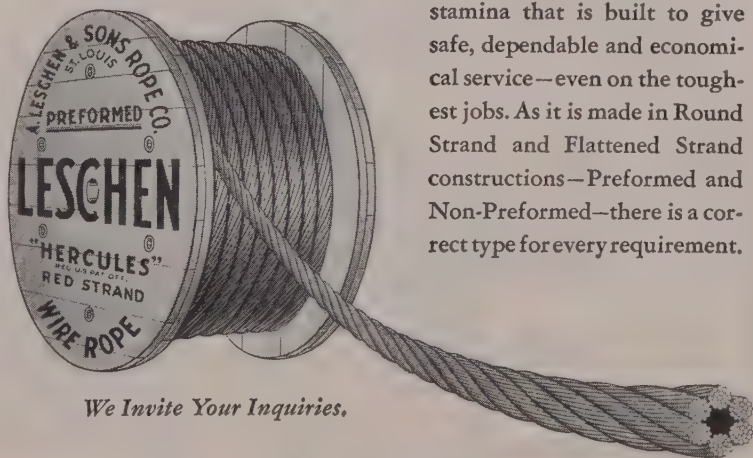
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demand has declined, January turnover having been considerably less than a year ago and collections are slow. Eastern Washington, in below zero weather most of the last month, has been most seriously affected. Jobbing prices are firm and unchanged. There is no easing in sheets and plates, while reinforcing is still tight. Nails are in better supply, and alloys are in fair demand. Wholesale stocks have increased but are still far below normal, particularly in some items.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 143

Cleveland—Demand for bolts and nuts is down slightly from some directions, although up from the automobile industry. An easing in ordering is noted from jobbers, the refrigerator and washing machine producers, and stovemakers. Jobbers are increasingly cautious in new ordering, especially those still holding substitutes stocked in the early postwar days. The increase from the automotive trade is attributed to expansion of replacement parts production.

Rivet makers still find a respectable demand for their product, although ordering has been declining for the last five or six months and producers are soliciting business. The decline in demand is attributed principally to reduced requirements of railroad car builders.

Despite the business decline, rivet makers still can't get enough steel to satisfy their needs. One bolt and

nut maker reported that although it has noted a slight improvement in steel receipts, inventories still are unbalanced.

Prices of bolts and nuts and rivets remain unchanged.

Revises Uranium Ore Prices

Washington—United States Atomic Energy Commission has extended through June 30, 1954, the guaranteed minimum prices paid for uranium-bearing carnotite-type and roscoelite-type ores of the Colorado Plateau area. This action was taken to encourage private investment in development of new mines and construction of additional mining facilities.

The new extensions do not affect the guaranteed minimum prices for high-grade ores, which are not due to expire until 1958. The development allowance of 50 cents per pound of contained uranium oxide has been extended to all ores containing 0.1 per cent U_3O_8 or more. Adjustments also have been made in the prices for ores within the range of 0.1 per cent U_3O_8 and 0.2 per cent U_3O_8 so that price increments will be more uniform and will result in increased prices for certain low-grade ores.

The commission also announced that it "will be interested in discussing arrangements for deliveries to it of uranium-bearing materials other than those for which guaranteed prices have been established, such as tailings, mill products, and ores of

types not acceptable under this circular."

In line with this provision, the commission intends to install a process in its Monticello, Utah, mill for processing high-lime ores which are not acceptable under the regular price schedule, and which private operators have been unable to process. There are important tonnages of high-lime ores tributary to Monticello which can be mined at relatively low cost. The commission hopes to purchase eventually high-lime ores at the Monticello plant on a negotiated basis.

The policy of limiting the overall purchase of vanadium to the ten to one ratio will be continued. The application of this ratio to individual deliveries may be waived, however, for limited periods if a plant feed of higher vanadium content is needed to improve uranium recovery.

Canada . . .

Toronto, Ont.—Canadian Manufacturers' Association's special committee on steel reports that so far as United States mills are concerned there are positive signs that pressure for delivery of steel is easing. Prospect is that by the third quarter a buyers' market will develop in some steel products.

The bottom has dropped out of the gray market on steel sheets.

While there has been no apparent move by the governments to enlarge the nominal Canadian import quota of 200,000 to 220,000 product tons of steel per quarter from the United States, the only actual control exercised over imported steel in Canada has been the rather loose one on structural steel. If steel becomes easier in the third quarter, there will be little or no reason for the United States government to insist that Canada live within the quota.

There has been a steady increase in the supply of steel coming to Canada from the United Kingdom and Belgium, with the expectation that substantially larger shipments will be made from those countries in 1949.

The committee stated that the recent price break in cast iron scrap prices in the United States was not an indication that supplies were becoming more plentiful. On the contrary the price change was merely a rationalization, bringing cast scrap prices more into line with pig iron prices. It is maintained that the scrap situation is serious and that the shortage would last for many years.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

37,000 tons, including 4000 tons of cable and suspension rope and several hundred tons of miscellaneous steel items, Delaware River Memorial bridge, near Wilmington, Del., to American Bridge Co., Pittsburgh.

3750 tons, hangar construction, municipal Idlewild Airport, New York, through the Stock Construction Co., to American Bridge Co., Pittsburgh.

1200 tons, building 12-Y, General Electric Co., Pittsfield, Mass., to Lehigh Structural Steel Co., Allentown, Pa.

455 tons, sheet steel piling, Corps of Engineers, Nashville, Tenn., to Bethlehem Steel Co.

235 tons, factory building, Renwall Mfg. Co..



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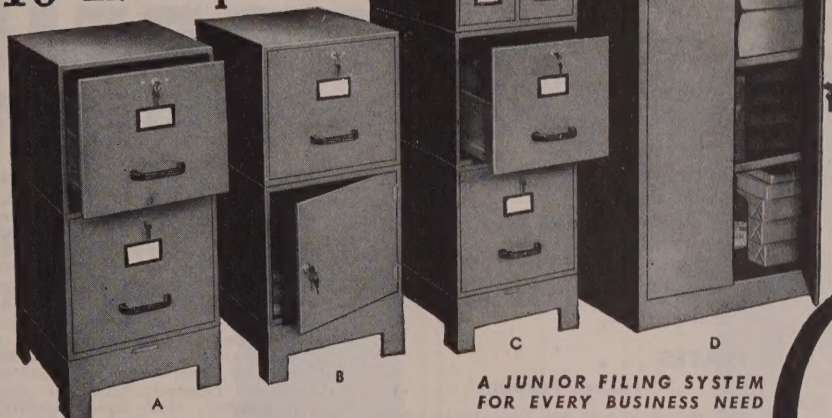
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200 tons, substation for Bonneville Power Administration, to Isaacson Iron Works, Seattle.
160 tons, plant addition, Stanley G. Flagg, Stowe, Pa., to Lehigh Structural Steel Co., Allentown, Pa.
155 tons, store building, Franklin Simon Co., Newton, Mass., to Bethlehem Steel Co.
Unstated, warehouse for Inland Empire Steel Co., Spokane, Wash., to General Machinery Co., Spokane.

STRUCTURAL STEEL PENDING

6000 tons, state turnpike bridge, near Steelton, Pa.; bids Feb. 28.
1000 tons or more, 1352-foot state highway bridge, at Lewiston, Idaho; Henry Hagman and Erickson Paving Co., Cashmere, Wash., joint low bidders, \$539,191.
400 tons, gravel plant, Hungry Horse, Mont.; bids in to General-Shea-Morrison, general contractors.
400 tons, state hospital, Embreesville, Pa.; bids closed.
150 tons, four-span, 220-foot, steel deck girder bridge, West Peterborough highway bridge, West Peterborough dam, Hancock, N. H.; bids Mar. 8, Corps of Engineers, Boston.
140 tons, addition, Catholic high school, Harrisburg, Pa.; bids closed.
100 tons, addition to Gorge powerhouse; bids to Seattle, Feb. 23.
Unstated tonnage, structural material, Columbia-Grand Coulee No. 3 line, American Bridge Co., Pittsburgh, low, \$618,746.11, Bonneville Power Administration, Portland, Oreg.
Unstated, 1200-foot, Sauvies Island Oregon state bridge; general contract to Gilpin Construction Co., Portland, low \$809,440.

Unstated tonnage, section of cross Bronx expressway, estimated to cost \$3,375,400, Bronx county, New York; bids Feb. 16.
Unstated, cable trays, also two railroad bridges, Columbia Basin project; bids to Bureau of Reclamation Jan. 27 and Mar. 1, respectively.

REINFORCING BARS . . .

REINFORCING BARS PLACED

100 tons or more, F. W. Woolworth building, Longview, Wash., to Mercer Steel Co., Portland, Oreg.

REINFORCING BARS PENDING

6000 tons, East low canal, Columbia Basin project; bids to Bureau of Reclamation, Denver, late February.
2340 tons, North dam, Columbia Basin projects, bids in to Bureau of Reclamation, Denver, Feb. 11.
1310 tons, state turnpike bridge, near Steelton, Pa.; bids Feb. 28.
450 tons, junior high school, Seattle; bids Feb. 15.
100 tons, Gorge powerhouse addition; bids to Seattle, Feb. 23.

PLATES . . .

PLATES PENDING

300 tons, $\frac{3}{4}$ to 1/35 inch plate, Gorge powerhouse penstock; bids to Seattle, Feb. 23.
Unstated, bulk oil storage plant, at Whittier, Alaska; bids to U. S. Engineer, about Mar. 1.

PIPE . . .

CAST IRON PIPE PENDING

140 tons, 3600 feet, 12-inch water pipe for Vancouver, Wash.; bids in Feb. 9; alternates for other types.

CONSTRUCTION AND ENTERPRISE

OHIO

ASHTABULA, O.—National Distillers Products Corp., 120 Broadway, New York, will build a \$10 million chemical plant in the State Road industrial area.
CANTON, O.—Timken Roller Bearing Co. purchased the Timken Defense Plant, 1025 Cleveland Ave., Columbus, from the WAA for \$3,243,707.
CLEVELAND—Youngstown Screw & Bolt Co. has been chartered through Robert L. Lewis, attorney, 837 Union Commerce Bldg., Cleveland, to manufacture and sell bolts, nuts, rivets and screws. Other incorporators are Zora Lotrey and Louis Berwitt.
CLEVELAND—Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., is carrying on a modernization program which includes purchase of machine tools, conveyors, materials handling, heat treating and baking equipment.
CLEVELAND—Plastic Match Plate Co. has been formed to manufacture match plates and patterns for the foundry industry. Officers are Ernest E. Harrison, 3730 W. 116th St., president; William H. Harrison, vice president; Jacob Marz, secretary, and Mrs. Edna Harrison, treasurer.
CLEVELAND—Lectro-Weld Inc. has been formed to operate a steel fabricating plant at 3495 W. 140th St. Officers are John A. Campbell Jr., president, and Lester J. Farber, treasurer.
CLEVELAND—General Motors Corp. has opened its \$3 million electromotive plant at 8500 Clinton Rd. under the management of A. C. Finigan. The plant is building diesel switch engines.

EASTLAKE, O.—Cleveland Electric Illuminating Co., 75 Public Square, Cleveland, will build a \$20 million power plant.
EAST LIVERPOOL, O.—Brush-Moore Newspapers Inc. has awarded a \$305,000 contract to Nellis Construction Co., 656 St. Clair Ave., for construction of a building to house the East Liverpool Review, newspaper plant.

SOUTH CAROLINA

CHARLESTON, S. C.—South Carolina Power Co., 141 Meeting St., will build two additional power plant units, one in 1950 to cost \$4,300,000, the other in 1951 to cost \$5 million; Gilbert Association Inc., 412 Washington St., Reading, Pa., engineer.

TENNESSEE

CHATTANOOGA, TENN.—L. B. Jackson & Co., Jackson Bldg., Bartlesville, N. C., will build a \$250,000 garage and motor repair shop.
NASHVILLE, TENN.—Franklin Limestone Co., 612 Tenth Ave. N., has awarded a \$100,000 contract to Wright Contracting Co., 502 25th Ave., Columbus, Ga., for construction of an asphalt mixing plant.

TEXAS

ANDREWS, TEX.—Phillips Petroleum Co. and Fullerton Oil Co., Bartlesville, Okla., will build a \$2,225,000 gasoline plant.
DALLAS—Thompson-Hayward Chemical Co. of Texas, 2026 Singleton Bldg., will build a \$400,000 chemical plant.
GRAPELAND, TEX.—Geier-Jackson Inc. will build a \$350,000 gasoline refining plant.
PORT ARTHUR, TEX.—Gulf Oil Corp. plans to build three atmospheric vacuum topping stills to cost \$8 million.
VICTORIA, TEX.—Central Power & Light Co., 129 N. Chaparral St., Corpus Christi, plans a \$750,000 electric power plant and distributing facilities expansion.
WICHITA FALLS, TEX.—Bolin Trust Co. plans to build a \$350,000 gas repressuring plant.

VIRGINIA

LYNCHBURG, VA.—National Battery Co., c/o

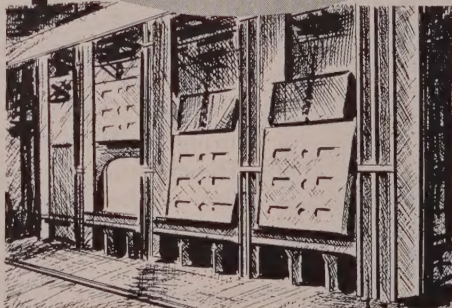
*For Complete Fulfillment
Of Open Hearth Needs*

call on



WHATEVER your open hearth requirements . . . whether it's a complete job of design, construction and installation of a new furnace . . . or the rebuilding of an existing furnace . . . F.E.I. has the men, the experience and the know-how to do the job as you want it done.

You are invited to consult with us with no obligation to you.



F.E.I. ALSO BUILDS: Open Hearth Furnaces; Soaking Pits; Continuous Bloom, Billet and Slab Heating Furnaces; Direct Fired Cover Furnaces for sheet and coil annealing; Salt Descaling Furnaces for stainless steel sheet, bar and other products; Heat Treating Furnaces for every use; Galvanizing Furnaces for tubes, sheet and metalware.

FURNACE ENGINEERS, INC.

1555 West Liberty Ave.

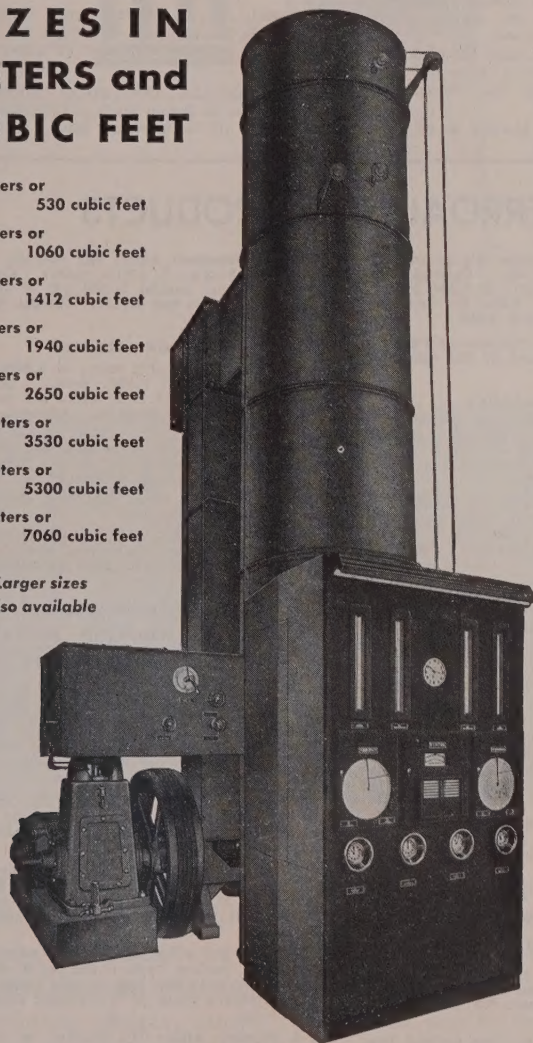
Pittsburgh 26, Pa.

Expansion Engine Type Medium Pressure **OXYGEN and NITROGEN** PRODUCING PLANTS

SIZES IN METERS and CUBIC FEET

15 Meters or	530 cubic feet
30 Meters or	1060 cubic feet
40 Meters or	1412 cubic feet
55 Meters or	1940 cubic feet
75 Meters or	2650 cubic feet
100 Meters or	3530 cubic feet
150 Meters or	5300 cubic feet
200 Meters or	7060 cubic feet

Larger sizes
also available



Built in standard size as listed above in single and double rectification units. Streamlined panel provides quick visibility of all gauges. Compact design—requires minimum of floor space.

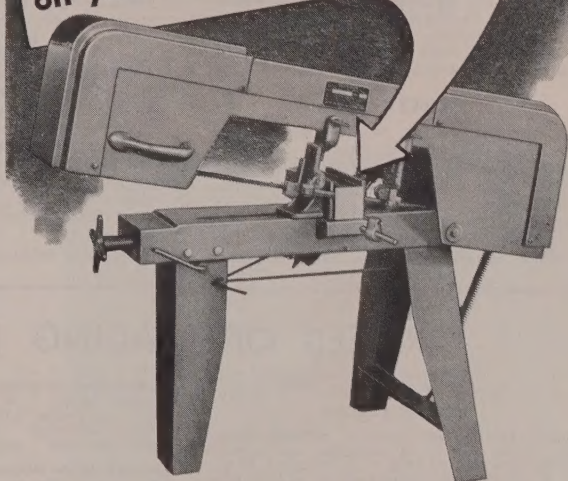
INDEPENDENT ENGINEERING COMPANY, Inc.

CONSULTING •  RESEARCH
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Manufacturers of
CYLINDERS AND GAS PRODUCING EQUIPMENT
ACETYLENE • OXYGEN • HYDROGEN • NITROGEN

O'FALLON, ILLINOIS

Here's where you
start saving . . .
on your metal cut-off work



The **JOHNSON** *metal cut-off* **BAND SAW**

It has extra **speed**, because of its extreme rigidity and saw support which enables more feet-per-minute in saw travel. It has **accuracy** which gives square, true cuts, reducing machining time.

It has **adaptability**—with extra large capacity (in Model J), and easy portability (in Model B). It cuts the cost of cut-off work. Get the Johnson Band Saw catalog—write today.

TWO TYPES

Model J, a heavy sturdy tool, cuts 10" rounds, 18" flats. Model B (illustrated) lighter, portable, of rigid twist-proof construction, cuts 5" rounds, 10" flats.

JOHNSON
MANUFACTURING CORP.
623 CHRYSLER BUILDING
NEW YORK 17, N. Y.

contractor, has awarded a contract to C. L. Lewis Inc., for construction of a \$250,000 battery manufacturing plant.

WASHINGTON

SEATTLE—Associated Lead & Zinc Co., 2736 16th St., S. W., will build a \$100,000 lead and zinc factory addition.

VANCOUVER, WASH.—Buffalo Electro-Chemical Co., River Rd. and Sawyer Ave., Tonawanda, N. Y., will build a \$1 million plant.

VANCOUVER, WASH.—Aluminum Co. of America has awarded a contract to Erland & Bickel, Vancouver, for grading a site for a new aluminum rod wire and electrical transmission cable plant to be built near Alcoa's pig aluminum plant.

WISCONSIN

MENOMONEE FALLS, WIS.—Stolper Steel Products Co., 3258 W. Fond du Lac Ave., Milwaukee, will build a factory; plans by Grassold & Johnson, 734 N. Jefferson St., Milwaukee.

MILWAUKEE—Continental Can Co., 100 E. 42nd St., New York, has awarded a \$5 million contract to Klug & Smith Co., 4425

W. Mitchell St., for construction of a can manufacturing plant.

ALASKA

FAIRBANKS, ALASKA—Pacific Alaska Development Co. plans to build a \$10 million warehouse and 300 housing units, c/o Gerald Field, architect, Jones Bldg., Seattle.

CANADA

EDMONTON, ALTA.—McCull-Fontenay Oil Co., 360 St. James St. W., Montreal, Que., plans to build a \$10 million refinery.

TORONTO, ONT.—Crouse Hinds Co. Ltd., 7 Lavatt Ave., has awarded a \$150,000 contract to Ramsay Contracting Co. Ltd., 170 Perth St., for construction of a foundry.

TORONTO, ONT.—Baker Platinum Co. of Canada Ltd., 512 E. King St., has awarded a \$115,000 contract to George Construction Co. Ltd., 63 Belvedere St.; Marani & Morris, 1250 Bay St., architect.

VIRGINIATOWN, ONT.—Kerr Addison Gold Mines Ltd. will build a \$100,000 plant; John Mitchell, 216 Bay St., Toronto, engineer.

MONTREAL, QUE.—H. Morgan & Co. Ltd.,

585 St. Catherine St. W., has awarded a \$300,000 contract to Sutherland Construction Co. Ltd., 1440 W. St. Catherine St., for construction of a factory and garage; S. M. Sproule, c/o owner, architect, Barott & Associates, Canada Cement Bldg., associate architect.

CAP DE LA MADELEINE, QUE.—Norton Co. plans \$1 million plant improvements.

MONTREAL, QUE.—B & H Metal Industries Ltd., 1065 Papineau Ave., has awarded a \$100,000 contract to Collet Bros. Ltd., 1978 Porthenais St.; G. Beaulieu, 3607 St. Denis St., architect, Lafrancois & Laflamme, 2100 Bellechasse St., engineer.

ST. ADRIEN DE HAM, QUE.—International Asbestos Co. Ltd., 66 Wellington St. W., Sherbrooke, plans to build a \$950,000 mill.

SOUTH AMERICA

CHUQUICAMATA, CHILE—Chile Exploration Co., Santiago, plans to build a \$10 million refining plant for treatment of copper sulfide ores.

BARRANQUILLA, COLOMBIA—Industria Colombiana de Rayon plans a \$200,000 alterations to its sulfuric acid plant.

PRICES OF LEADING FERROALLOYS PRODUCTS

(Continued from Page 143)

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 18.5c per lb of contained Si; packed 19.90c; ton lots 21.00c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 11.3c per lb of contained Si, carload packed 12.9c, ton lot 14.35c, less ton 16c. Delivered. Spot, add 0.8c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.
75% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per lb of contained Si, carload packed 14.8c, ton lot 15.95c, less ton 17.2c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk 14.65-15c per lb of contained Si, carload packed 15.9c, ton lot 16.9c, less ton 18.05c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.) Add 0.7c to 85% ferrosilicon prices.
90-95% Ferrosilicon: Contract, carload, lump, bulk, 16.5c per lb of contained Si, carload packed 17.7c, ton lot 18.65c, less ton 19.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.) Add 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe.). C.I., lump, bulk, regular 19.0c per lb of Si c.i. packed 20.2c, ton lot 21.1c, less ton 22.1c. Add 1.6c for max. 0.10% calcium grade. Deduct 0.4c for max 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 8.90c per lb of alloy, ton lots packed 10.3c, 200 to 1999 lb 10.65c, smaller lots 11.15c. Delivered. Spot up 0.5c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3% lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 13.75c per lb of briquet, carload packed 14.45c, ton lot 15.25c, less ton 16.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk, 10.00c per lb of briquet, c.i. packaged 10.8c, ton lot 11.6c, less ton 12.5c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.i. bulk 10.0c, per lb of briquet, c.i. packed 10.8c, ton lot 11.6c, less ton 12.5c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.15c per lb of briquet, c.i. packed 6.95c, ton lot 7.75c, less ton 8.65c. Delivered. Spot, add 0.25c.

(Small size—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.30c, c.i. packed 7.10c, ton lots 7.90c, less ton 8.80c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybde-Oxide Briquets: (Containing 2½ lb of Mo each) 95.00c per pound of Mo contained. F.o.b. Langloeth, Pa.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18%, and Si 53-59%). Contract, carload, lump, bulk 19.25c per lb of alloy, carload packed 20.0c, ton lot 21.55c less ton 22.55c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 17.9c per lb of alloy, carload packed 19.1c, ton lot 21.0c, less ton 22.5c. Delivered. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.). Contract, ton lots, 2" x D, \$1.40 per lb of contained Ti; less ton \$1.45. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.). Ton lot \$1.25, less ton \$1.35. F.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract, \$160 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: Ti 17-21%, C 3-4.5%. Contract, \$175 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

VANADIUM ALLOYS

Ferrovanadium: Open-Hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max.). Contract, any quantity, \$2.90 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 0.5-1% max.), \$3. **Primos and High Speed Grades** (Va 35-55%, Si 1.50% max., C 0.20% max.), \$3.10.

Vanadium Oxide: Contract, less carload lots, \$1.20 per lb of contained V₂O₅, freight allowed. Spot, add 5c.

Grainal: Vanadium Grainal No. 1, 93c; No. 6, 63c; No. 79, 45c, freight allowed.

TUNGSTEN ALLOYS

Ferrotungsten: (W 70-80%). Contract, 10,000 lb W or more, \$2.25 per lb of contained W; 2000 lb W to 10,000 lb W, \$2.35; less than 2000 lb W, \$2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Contract or spot, 1000 lb or more, \$2.90 per lb of contained W; less than 1000 lb W, \$3.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Contract, c.i., lump, bulk 6.6c per lb of alloy, c.i. packed 7.35c, ton lot 8.1c, less ton 8.95c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 3-12%, C 0.60% max.). Contract, carload, lump, packed 20.25c per lb of alloy, ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more, 1" x D, \$1.20 per lb of alloy. Less than 100 lb \$1.30. Delivered. Spot, add 5c.

Borasil: (3 to 4% B, 40 to 45% Si), \$6.25 per lb contained B, f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). Net ton to carload, 8c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Mn 5% max., Si 8% max., C 0.5% max.). Contract, ton lot, 2" x D, \$2.90 per lb of contained Cb, less ton \$2.95. Delivered. Spot, add 25c.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Carload, 12 M x D, carload packed 19.0c per lb of material, ton lot 19.75c, less ton 21.0c. Delivered.

Sileaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, Boron 0.55-0.75%). Carload, packed, 1" x D, 43c per lb of alloy, ton lot 45c, less ton 47c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed, 1½" x 12 M, 16.5c per lb of alloy, ton lots 17.25c, less ton 18.5c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.I. packed, 16.50-17.00c per lb of alloy; ton lots 17.90-18.00c; less ton lots 19.40-19.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.I. packed, 14.25c per lb of alloy; ton lots 15.75c; less ton lots 17.00c, f.o.b., Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al). Packed, lump, carload 11c, ton lots 11.25c, smaller lots 11.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Ferrophosphorus (23-25% based on 24% P content with unitage of \$3 for each 1% of P above or below the base): Gross tons per carload, f.o.b. sellers' works, Mt. Pleasant, or Siglo, Tenn.; \$65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, contained Mo, f.o.b. Langloeth and Washington, Pa., furnace, any quantity \$1.10.

Technical Molybde-Oxide: Per lb, contained Mo, f.o.b. Langloeth, Pa., packed in bags containing 20 lb of molybdenum, 95.00c.